AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING
ENGINEERING • PRODUCTION • MANAGEMENT

NOVEMBER 1, 1954

In This Issue

Chevrolet and Pontiac V-8s for 1955
Paris Show Features 1300 Exhibitors
Packard's V-8 Engines in Production
Trends in British Commercial Vehicles
Methods to Boost Defense Plane Output
Latest Designs of Communist Satellites

COMPLETE TABLE OF CONTENTS, PAGE 3

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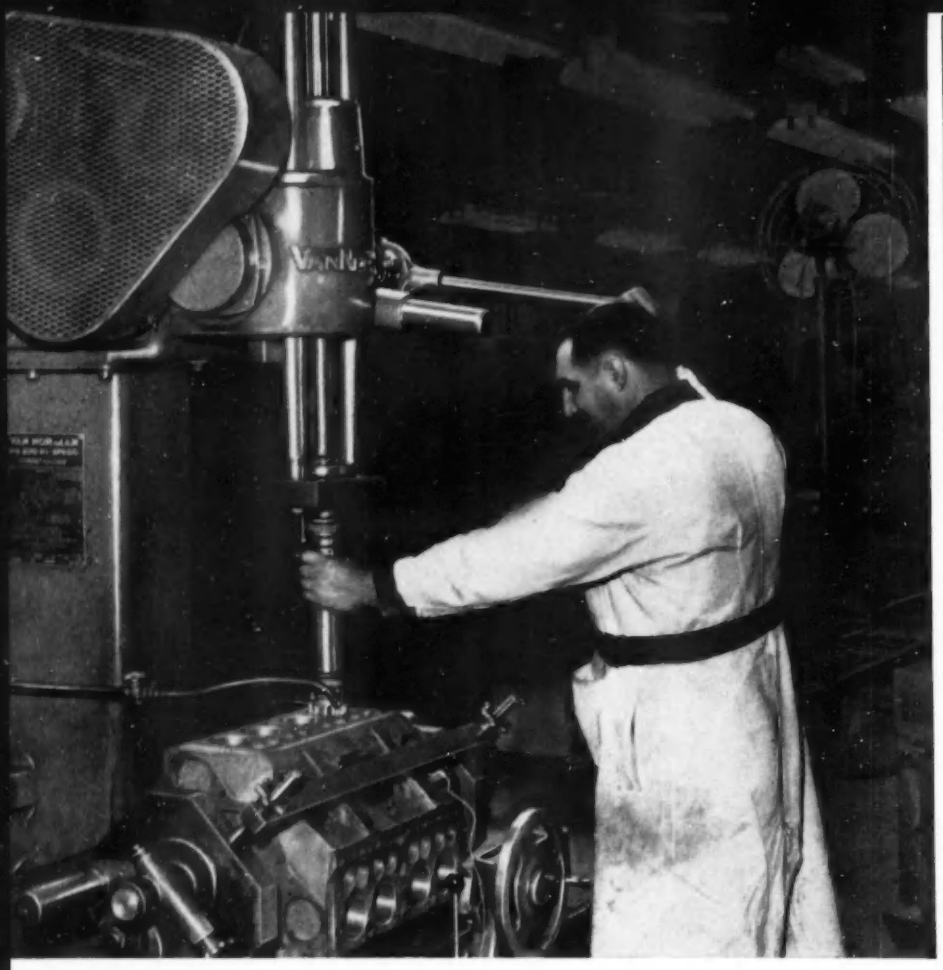

Better honing results from start to finish with...

STANICUT
TRADE MARK
Cutting Oil

A midwest metalworking company—rebuilder of a popular automobile engine—had a cutting oil problem. On the honing operation, shown above, the finish obtained on engine cylinders did not measure up to the high quality desired by that firm. Various honing oils were tried without measurable improvements.

The problem was put to a Standard Oil cutting oil specialist. He recommended the use of STANICUT Oil No. 62 FC, a light-colored, light-bodied cutting oil that contains the correct proportion of extreme-pressure and friction-reducing ingredients. From every angle, STANICUT has proved ideal for the job. The desired finish has been obtained on the cylinders. Tool life has been greatly increased. Oil consumption has been reduced.

Whatever your machining operation, the Standard Oil cutting oil specialist serving your area of the Midwest has the cutting oil that will meet your needs. He has the experience and special training necessary to help you get better cutting oil results. How you can get his help easily and quickly is explained at the right. Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

What's YOUR Problem?

J. E. Weston, of Standard Oil's Kansas City office, is the lubrication specialist who helped this metalworking company solve a "finish" problem on the honing operation described at the left.

Like all of the many Standard lubrication specialists located throughout the Midwest, he has the experience and special training necessary to analyze his customer's needs. Like all of Standard's lubrication specialists, he is close at hand and therefore able to give his customer on-the-spot assistance.

You can reach the lubrication specialist serving your area of the Midwest by phoning your local Standard Oil office. He will be glad to discuss your operations and with no obligation to you. There may be savings for you in the benefits offered by such outstanding cutting oils as:

STANICOOL HD Soluble Oil — Because it contains additional compounding, this heavy-duty soluble oil possesses not only the cooling ability of an emulsion but also the ability to give better tool life and finer finishes than can be obtained with a conventional soluble oil.

STANOSTAMP Compounds — Here are three established products for stamping or heavy drawing operations of either low-carbon or alloy steels. Water can be added to these paste compounds to provide the most economical applications. STANOSTAMPS offer maximum protection for dies and work. These compounds can be removed readily in conventional washing equipment.

STANDARD OIL COMPANY

STANDARD *(Indiana)*

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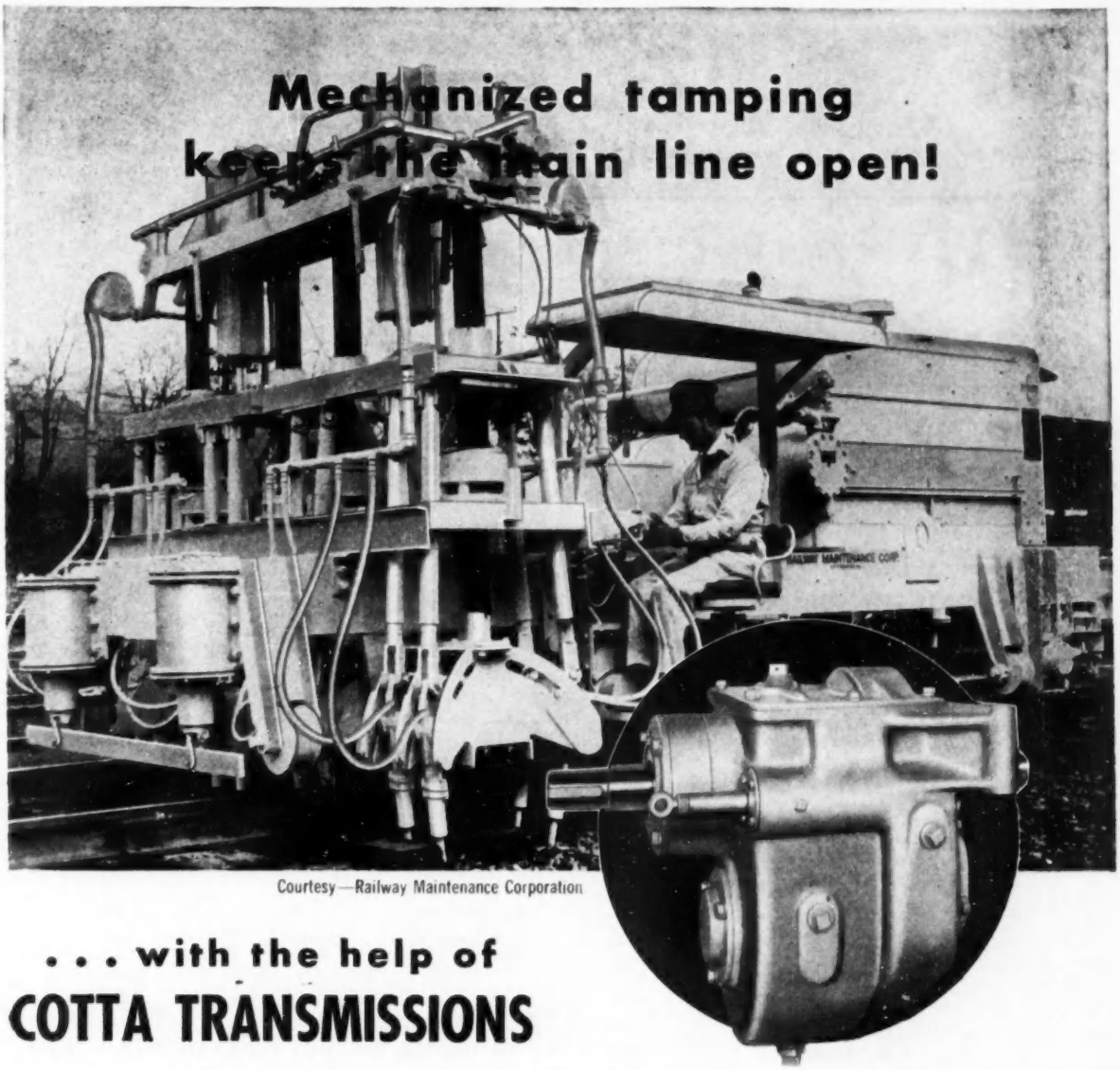

Courtesy—Railway Maintenance Corporation

. . . with the help of COTTA TRANSMISSIONS

• Dependable operation of mobile maintenance machinery prevents interference with main line traffic.

That's why Railway Maintenance Corporation, Pittsburgh, Pa., provides added protection to users of its fast and versatile *McWilliams Tie Tamper* with Cotta Heavy-Duty Transmissions. Built for continuous, heavy-duty operation . . . in every climate and weather . . . the Cotta Transmission will give trouble-free service throughout the life of the Tie Tamper.

If ordinary gear boxes are too light for your job, Cotta can give you a standard transmission, with multi-speeds forward and reverse, or a low-cost, customed-design unit that fits your available space exactly.

And, for use with torque converters on trucks, rail cars, and other equipment requiring easier control of power through a wide range of torque and speed conditions, Cotta designs transmissions that combine "top" performance, low first cost . . . and low maintenance!

Thousands in operation throughout the United States and foreign countries . . . on a variety of tough construction and maintenance jobs . . . you can't go wrong when you specify Cotta! Input torques from 150 to 2500 ft. lbs.

THIS INFORMATION WILL HELP YOU

Diagrams, capacity tables, dimensions, and complete specifications sent free on request. Just state your problem—COTTA engineers will help you select the right unit for best performance. May we work with you?

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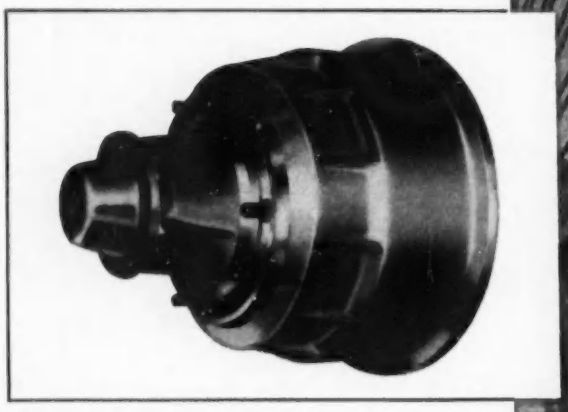
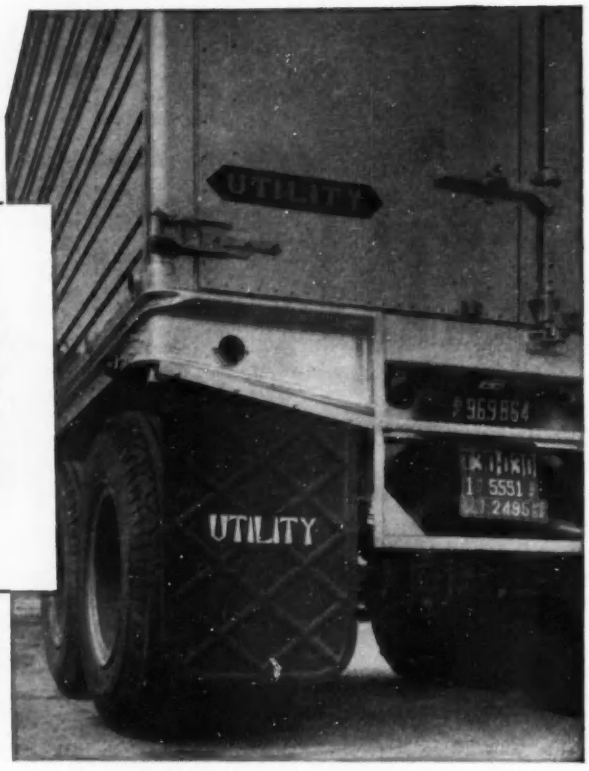
COTTA

HEAVY-DUTY TRANSMISSIONS

"Engineered-to-order"





2% NICKEL CAST IRON BRAKE DRUM . . . designed to increase actual amount of braking surface. Cooler operation from reduced pressure per square inch, results in longer lining life and, obviously, safer operation. Produced by Utility Trailer Manufacturing Co., Los Angeles 54, Calif.

Meet a Superior Brake Drum

. . . Nickel cast iron that beats heat and wear

On steep mountain grades . . . or in the desert's heat . . . or in stop-and-go city traffic . . .

Brake drums on Utility trailers do more than resist shock, abrasive wear and galling.

Utility Trailer Manufacturing Company demands drums made of an iron that resists intense frictional heat from restricted surfaces no matter how long or steep the grade. The metal must resist distortion and heat-checking under all kinds of adversities.

And to make sure their drums have this combination of properties, the company's engineers specify the castings in 2% nickel cast iron.

Utility has used nickel cast iron for years. In fact, they developed their long-lasting brake drums to take full advantage of the improved properties of this alloy.

Hundreds of users have written unsolicited letters in praise of the Utility 10″ brake. For instance, A. W. Hays of Hays Trucking Company, Woodland, California, wrote:

> "In my fleet of trucks and trailers I have thirty-two Utility trailers. My drivers think these trailers have the best brakes of any trailers they have ever pulled. The maintenance cost is very low, some of the trailers have gone over 250,000 miles and the brakes do not need relining."

Utility's brake drums exemplify only *one of many* combinations of properties offered by nickel cast irons. Your own needs may call for a different combination. Investigate how the right type of nickel iron may improve *your* products or equipment. Full information is yours for the asking. Send the coupon now.

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A CHILTON MAGAZINE AI PUBLISHED SEMI-MONTHLY

AUTOMOTIVE INDUSTRIES

NOVEMBER 1, 1954 VOL. III, NO. 9

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FEATURES

Paris Automotive Show Attracts 1300 Exhibitors from 14 Nations. *By W. F. Bradley* 48
1955 Chevrolet All New. *By Joseph Geschelin* 52
Defense Plane Production Discussed at SAE Aeronautic Meeting. *By R. Raymond Kay* 56
Pontiac for 1955 Has V-8 Engine, New Styling 58
Packard V-8's in Production. *By Thomas Mac New* 62
Communist Satellite Vehicles. *By David Scott* 67
Engineering Trends in British Commercial Vehicles. *By W. F. Bradley* 70

NEWS PREVIEWS

Chevrolet to Use Part of Willow Run Plant..... 33
GM Lays Out $182 Million for European Growth.. 33
Ford Building Annex to Engineering Unit..... 33
Chrysler Engines More Powerful, Styling Dramatic 34
New Continental to Have Some Features of Old.. 34
British Gas Turbine Tank Put Through Tests..... 35
Defense Contracts Go to Eight Mich. Companies 35
AMC Under Geo. Romney to Carry on Mason Plan 36
GM to Celebrate Milestone with Open House..... 37
Henney Sells Reo Lawn Mower Division..... 38
Stubnitz-Greene to Buy Reynolds Spring Co..... 38
Kaiser Planning Other Operations in S.A..... 39
Chevrolet Cites Reasons for Future Optimism.... 39

DEPARTMENTS

High Spots of This Issue..... 31
News of the Automotive and Aviation Industries 33
Men in the News 40
Machinery News. *By Thomas Mac New*..... 79
New Plant and Production Equipment..... 81
New Products 88
Free Literature and Free Information Service.... 89
Observations. *By Joseph Geschelin*..... 92
New Products for Aircraft..... 94
Metals. *By William F. Boericke*..... 96
Shorties 100
On Our Washington Wire 102
Calendar of Coming Events 109

Business Department Staff 31
Chilton Officers and Directors 31
Advertisers' Index 136

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THE TOUGH JOBS GO TO TEXACO

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is commemorating throughout 1954 the fiftieth anniversary of the track-type tractor . . . and Texaco is happy to join the celebration. For nearly twenty-five of those "Fifty Years on Tracks," Texaco Lubricants and Lubrication Engineering Service have been helping Caterpillar keep its production high, its costs low.

IN MACHINING, for example, Caterpillar has long used *Texaco Soluble Oils*. They assure better cutting, better finish and longer tool life because emulsions are more stable, and cool and lubricate better. They also assure a cleaner plant and lower oil consumption.

In addition, the know-how of Texaco Lubrication Engineers and their interest in keeping abreast of Caterpillar's problems have been helpful factors in achieving maximum machining efficiency.

Why not enjoy the benefits of Texaco Lubricants and Lubrication Engineering Service in *your* plant? They are available everywhere. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

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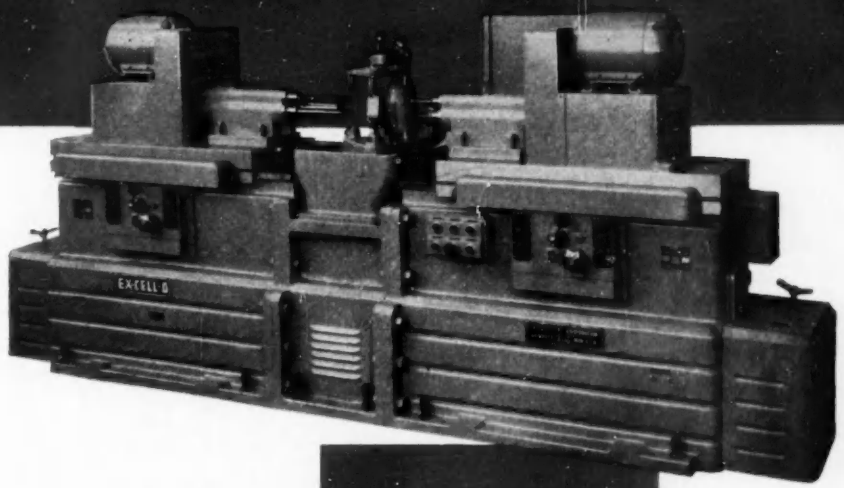
TUNE IN... TEXACO STAR THEATER starring DONALD O'CONNOR or JIMMY DURANTE on television . . . Saturday nights, NBC.

Modernize Today for Profits Tomorrow

WITH FAST, VERSATILE PRECISION WAY MACHINES

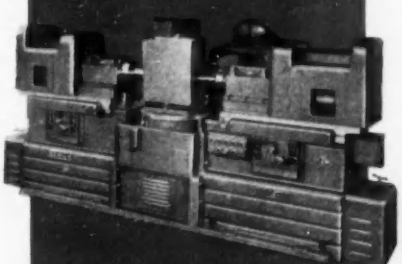


STYLE 58 TWO-WAY: Operates from a single push-button station. Handles large, heavy work. Fixture section can be designed to accommodate the way units from any angle.

Units may be re-arranged around fixture or new fixture sections designed for different operations.

STYLE 54 ONE-WAY: A standard way unit combined with a fixture unit to suit the work. Large, heavy, and awkward parts, loaded in the fixture, remain stationary; the spindles advance to the work.

STYLE 54 THREE-WAY: Standard way units are electrically interlocked to operate simultaneously, or in any sequence. Fast and efficient for machining parts from three directions and holding accurate locations.



STYLE 58 FOUR-WAY: Controlled from a central push-button station. Particularly suitable for machining parts from four directions simultaneously, and performing progressive operations.

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WAY TYPE PRECISION BORING MACHINES ARE PROFIT INSURANCE

Way Machines perform such operations as precision boring, turning and facing. They consist of one or more standard way units combined with a fixture section. Each way unit has its own hydraulic system and controls to operate the spindle slide. Tooling and fixture are added to suit the individual operation. Get details from your Ex-Cell-O representative or write for Way Machine Catalog.

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Wyman-Gordon technical know-how assures quality essential for maximum physical properties, uniform machinability and balance control . . . crankshaft forging specialists since the introduction of the internal combustion engine.

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Instrumentation by Honeywell means a single responsibility for your complete control equipment . . . coordinated engineering, production and delivery. It gives you the important plus values of simplifying the training of your instrument maintenance men, and of minimizing your maintenance parts stock problems. And because this line is so complete, the instrumentation recommended for your application is selected without bias . . . needs no stretching or squeezing . . . represents the best combination of performance and economy for its intended job.

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MINNEAPOLIS **Honeywell**

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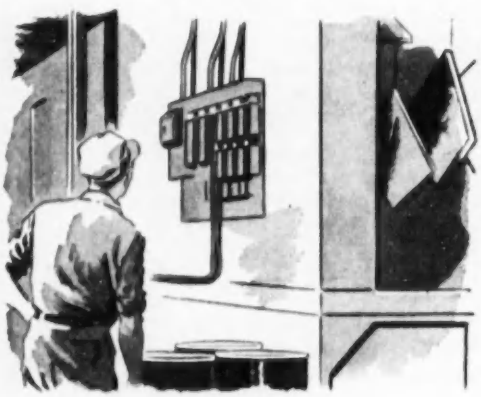
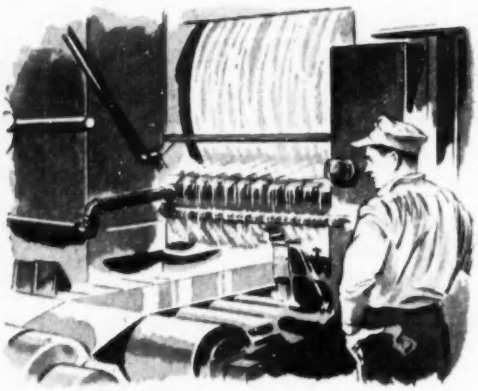


WASHING WITH NEW S.E.C.O. Thorough removal of grease and dirt provides clean surfaces for smooth, long-lasting finishes.



ROLLING WITH NEW S.E.C.O. Rolls stay clean. You get maximum reductions and low power consumption.

New Sunoco Emulsifying Cutting Oil increases production, cuts operating costs. Its high machining efficiency permits uniformly good finishes, prolongs tool life. Its high detergency and purity keep tools, parts and machines clean. Its excellent mixing qualities permit its use in cold, hard or hot water. Test New S.E.C.O. in your own plant. For more information, call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. AA-11.

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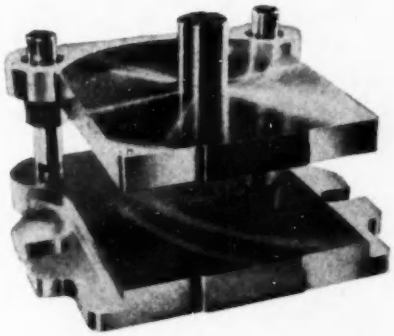
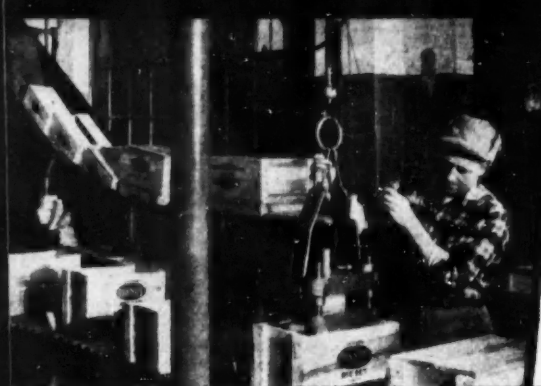
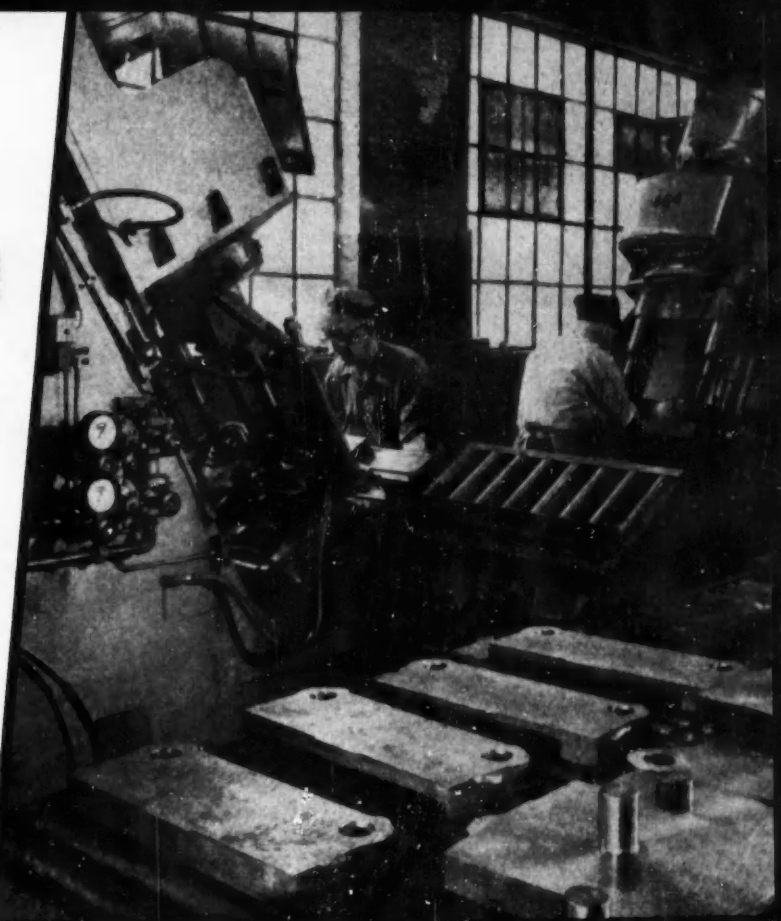


. . . made possible by Danly's unique mass-production and distribution system.



At your Danly Branch plant . . . shipping die sets to your order. Up-to-date procedures and facilities assure fastest delivery.



At the main Danly plant . . . high speed precision drilling, interchangeable fixtures accommodate the full range of standard die set sizes.

To make your tooling program move faster, Danly mass produces interchangeable, precision die set parts . . . stocks them at your local Danly Branch ready for quick assembly to your order and delivery to you. With Danly, from the time you place your order until the set is delivered to you is a matter of only a few days. This extra fast delivery starts at the main Danly plant in Chicago where two complete high-speed production lines turn out a wide variety of precision die set parts. Held in ample stock by your local Danly Branch, these interchangeable parts are assembled to your order and delivered immediately. Don't let lagging die set delivery bog down *your* tooling program. Order from your Danly Branch and get the fastest service . . . ever.

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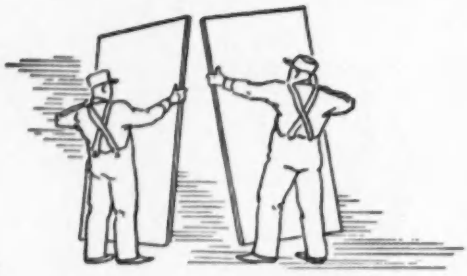
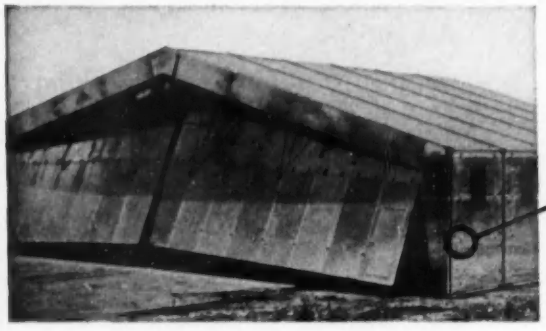
*DAYTON 7	3196 Delphos Avenue
*DETROIT 16	1649 Temple Avenue
*GRAND RAPIDS 2	118 High Bridge Street N.W.
*INDIANAPOLIS 7	42 West 10th Street
*LONG ISLAND CITY 1	47-28 37th Street
*LOS ANGELES 54	Oucommun Metals & Supply Co., 4900 South Alameda
*MILWAUKEE 2	111 East Wisconsin Avenue
*PHILADELPHIA 40	241 St. Courtland Street
*ROCHESTER 5	95 Potter Street

*Indicates complete stock



Have you a similar fastening problem?

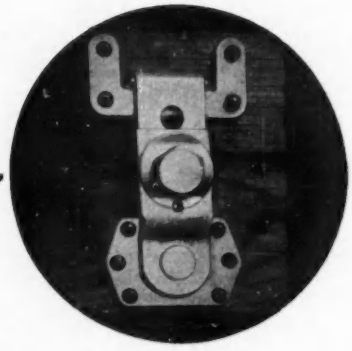
How a strong structure can be designed for speedy and simple assembly with unskilled labor, no special tools...



The U. S. Air Force wanted a jet-aircraft hangar design that would be portable by air, yet strong; would assemble quickly; be interchangeable, and flexible enough for easy structure modification.

The answer lay in a panel structure using modular units. Armorply honeycomb panels faced with thin aluminum, developed by United States Plywood Corporation, provide lightness, strength, flexibility. Joining one panel to the other in the field with untrained help was a problem until Simmons Fastener developed LINK-LOCK, a simple latching device that operates with minimum wrench pressure on hex nut.

This fastening problem is being successfully met by combining the design ingenuity of No. 1 LINK-LOCK with the proved performance of honeycomb plywood panels.



No. 1 LINK-LOCK—like No. 2 LINK-LOCK—features simplicity, positive action, high strength.

No springs are used in No. 1 LINK-LOCK. Locking action is obtained by rotating a nut that moves a sliding latch in and out of position. Up to 1500-lb. pull-down pressure is available; the device carries up to 4000-lb. tension. No. 1 LINK-LOCKS provide for surface mounting, simplifying installation.

Where can you use it? When you need heavy fastening pressures, resistance to impact, operation in 70-below temperatures—and where ease of action, compactness, and low cost are important factors. Write for a No. 1 LINK-LOCK Data Sheet.

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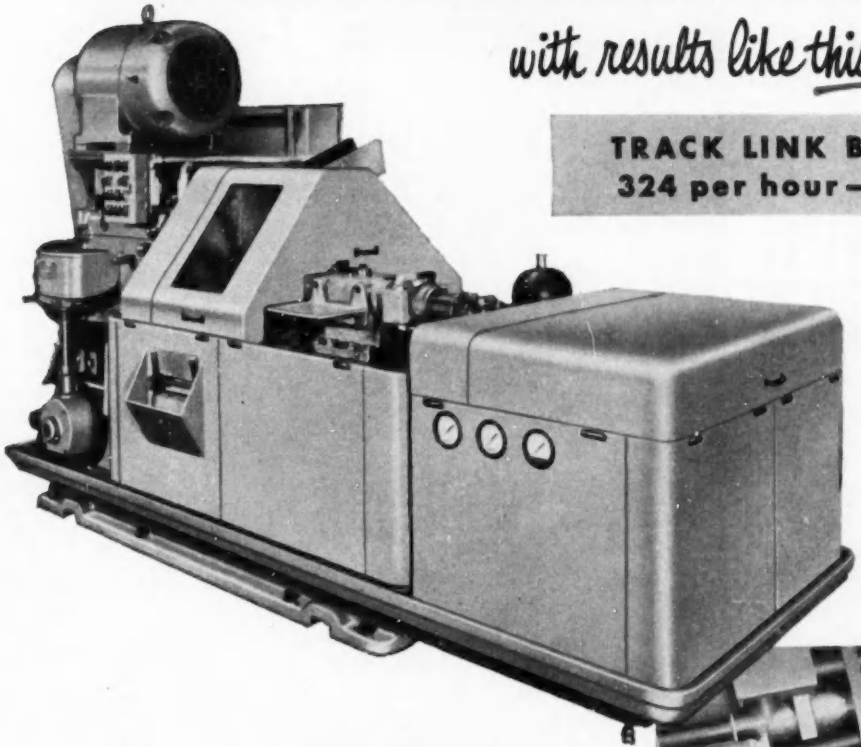
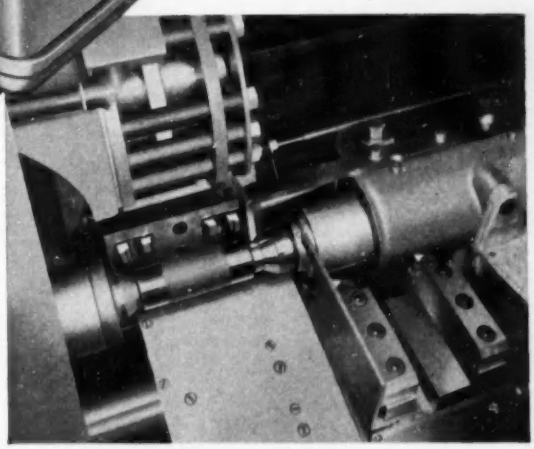
with results like this...

TRACK LINK BUSHINGS
324 per hour—780 SFM





Only minor tool adjustments are necessary to machine six different sizes of bushings on this 12" Fay Automatic Lathe with mechanical loading and unloading.

Operator merely loads the hopper feed and pushes the cycle start button. Operation is completely automatic. Both ends are turned at 780 SFM. At the end of the turning cut, driving jaws recede. Driving fixture and tailstock are withdrawn, the finished piece is removed from the machine by an inclined chute, and the cycle repeats.

As a safety feature, a limit switch stops the machine whenever there are fewer than three pieces in the hopper feed.

Modern Fay Automatic Lathes like this are the result of J&L's 24 years' experience in automaticity. They dramatically illustrate what can be achieved *when Hi-Velocity Turning is added to Automaticity.*

P.S.

Write today for the new Jones & Lamson booklet — "Production Seminars" — which discusses Hi-Velocity Turning as demonstrated on our production lines in Springfield.

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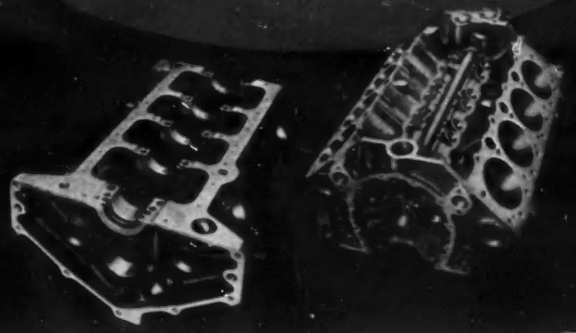
Another Transfer-matic by Cross

- ★ 100 pieces at 100% efficiency.
- ★ Operations: 265 drilling, 6 milling, 21 boring, 56 reaming, 101 countersinking, 106 tapping, and 133 inspection.
- ★ 104 stations: 1 for loading, 53 for machining, 7 for part handling, 6 for mechanical inspection, 36 for visual inspection, 1 for unloading.
- ★ 5 independent machine sections with provision for banking parts between each section; master automatic cycle for operating all 5 sections simultaneously.
- ★ Capacity for removing work piece at every station.
- ★ Automatic independent transfer mechanism for each machine section and automation units for handling parts from machine section to machine section.
- ★ Automatic air pressure test for high pressure oil holes and automatic depth inspection for all holes before tapping.
- ★ Pre-set tooling throughout.
- ★ Other features: Coolant system for tapping section, complete interchangeability of all standard and special parts for easy maintenance, construction to J.I.C. standards, hardened and ground ways, hydraulic feed and rapid traverse, automatic lubrication, automatic chip disposal.



Established 1898

THE CROSS CO.

DETROIT 7, MICHIGAN

Special MACHINE TOOLS

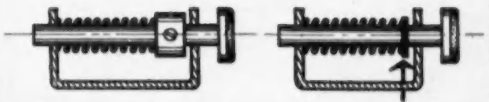
13 Waldes Truarc Rings Replace Bulky Fasteners... Save $.23 in 5 Sub-Assemblies of Tape Recorder!

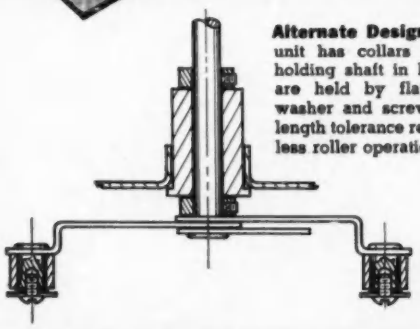
Telectro-Tape Magnetic Recorder

Made lighter, more compact and efficient, and produced at lower cost when Waldes Truarc Rings replace bulkier, more expensive fasteners.

Alternate Design: Pressure Pad Assembly. Collar and set screw secure pressure bar and spring.

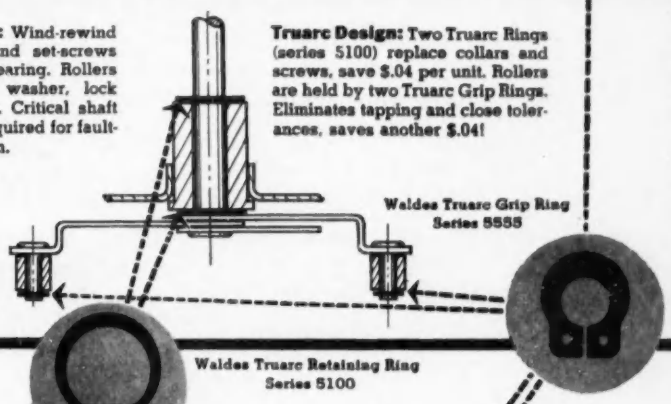
Truarc Design: Truarc Grip Ring replaces collar, reduces size of assembly, saves $.02/unit.

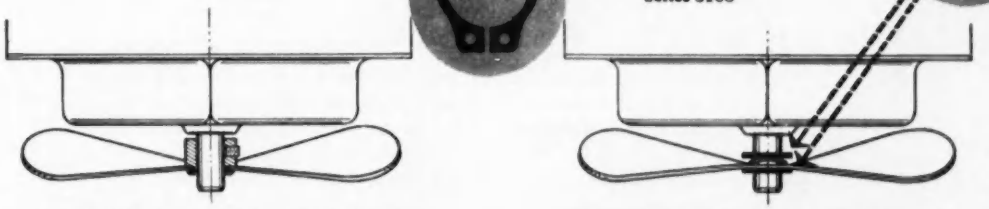




Alternate Design: Wind-rewind unit has collars and set-screws holding shaft in bearing. Rollers are held by flat washer, lock washer and screw. Critical shaft length tolerance required for faultless roller operation.

Truarc Design: Two Truarc Rings (series 5100) replace collars and screws, save $.04 per unit. Rollers are held by two Truarc Grip Rings. Eliminates tapping and close tolerances, saves another $.04!





Alternate Design: In motor-fan assembly, hub is secured rigidly to fan blades by staking. Fan assembly is secured to shaft with set screw.

Truarc Design: Two Truarc Grip Rings (series 5555) plus spring-type bowed washer save $.07 per unit... allow fan to slip if obstructed.

■ By using Waldes Truarc Retaining Rings in five sub-assemblies (three shown above), the Telectrosonic Corp. of Long Island City, N. Y., saves a total of $.23 per unit...by eliminating material, machining and skilled labor costs.

■ You, too, can cut costs with Truarc Rings. Wherever you use machined shoulders, bolts, snap rings, cotter pins, there's a Waldes Truarc Retaining Ring designed to do a better, more economical job. Waldes Truarc Rings are precision-engineered...quick and easy to assemble and dis-assemble.

■ Find out what Truarc can do for you. Send your blueprints to Waldes Truarc engineers for individual attention without obligation.

Write for a copy of the latest Truarc catalog.

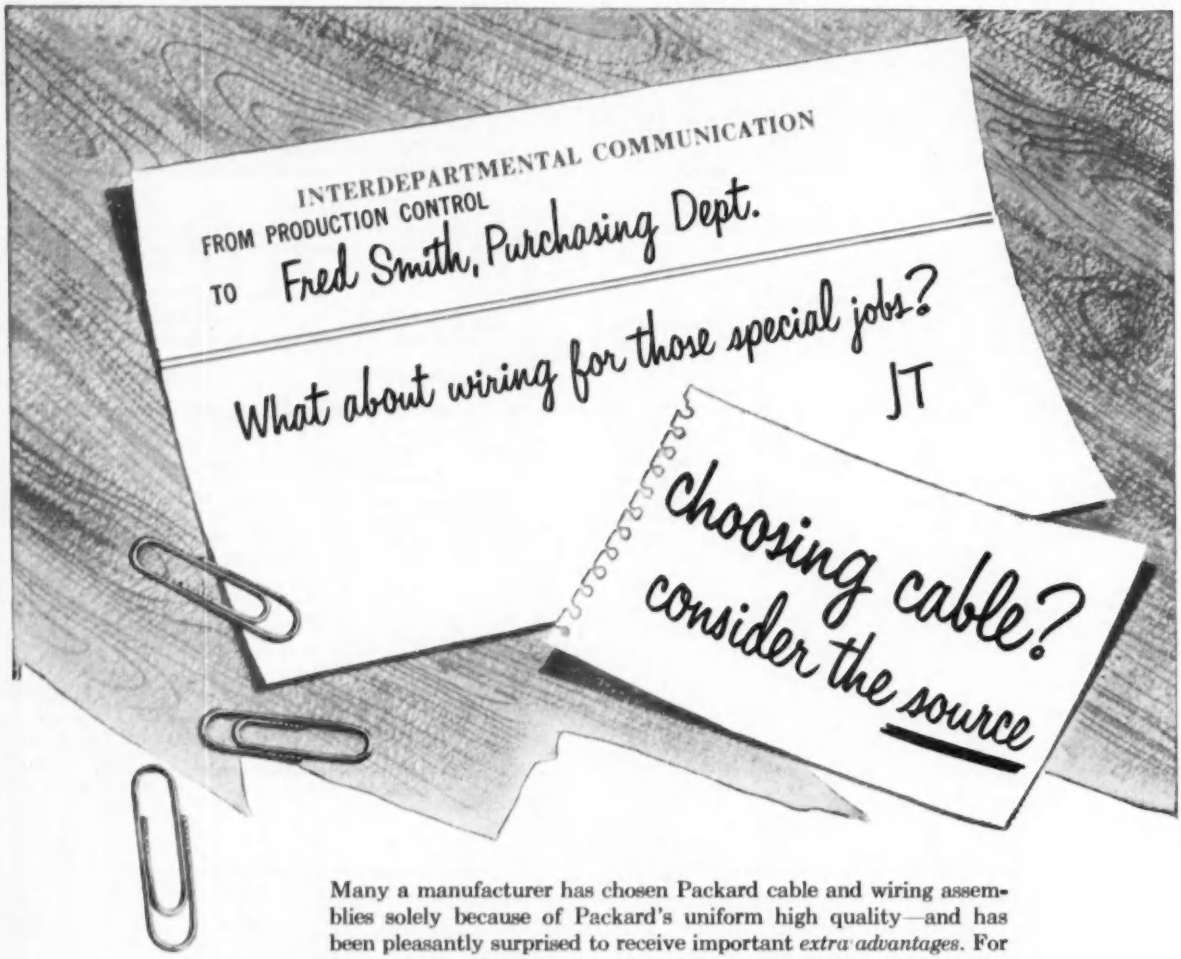
WALDES TRUARC RETAINING RINGS

REG. U. S. PAT. OFF.

■ For precision internal grooving and undercutting ... Waldes Truarc Grooving Tool

WALDES KOHINOOR, INC., LONG ISLAND CITY 1, NEW YORK

WALDES TRUARC RETAINING RINGS AND PLIERS ARE PROTECTED BY ONE OR MORE OF THE FOLLOWING U. S. PATENTS: 2,392,947; 2,392,949; 2,416,852; 2,439,841; 2,439,765; 2,441,846; 2,455,169; 2,420,941; 2,483,380; 2,483,383; 2,487,802; 2,487,803; 2,491,906; 2,509,061 AND OTHER PATENTS PENDING.



Many a manufacturer has chosen Packard cable and wiring assemblies solely because of Packard's uniform high quality—and has been pleasantly surprised to receive important *extra advantages*. For Packard provides experienced engineering counsel, production capacity sufficient for any need, and assured on-time delivery . . . and often it is intangibles such as these that help keep your production lines going.

Consider Packard as a source

The widespread use of Packard cable and wiring assemblies, by America's foremost automotive, aviation and appliance manufacturers, is your assurance of high quality. And, because Packard is equipped to turn out 7,000,000 feet of finished cable and 800,000 wiring assemblies *daily*, you can depend on unfailing delivery. In addition, Packard's large staff of engineers is ready to serve you at any time. Call on them—preferably while your new product or model is still on the drafting board. Their long experience in designing and fabricating cable and wiring assemblies can well result in important savings to you.

WE ARE PROUD TO JOIN IN CELEBRATING THE BUILDING OF GM'S FIRST 50 MILLION CARS—PROUD THAT GM CARS ARE WIRED BY PACKARD.

Packard

REG. U.S. PAT. OFF. TRADE MARK

Packard Electric Division • General Motors Corporation • Warren, Ohio

AVIATION, AUTOMOTIVE AND APPLIANCE WIRING

FILTRATION for AUTOMATION

Delpark

MAKES AN ASSIST ON Quality Control AT IBM

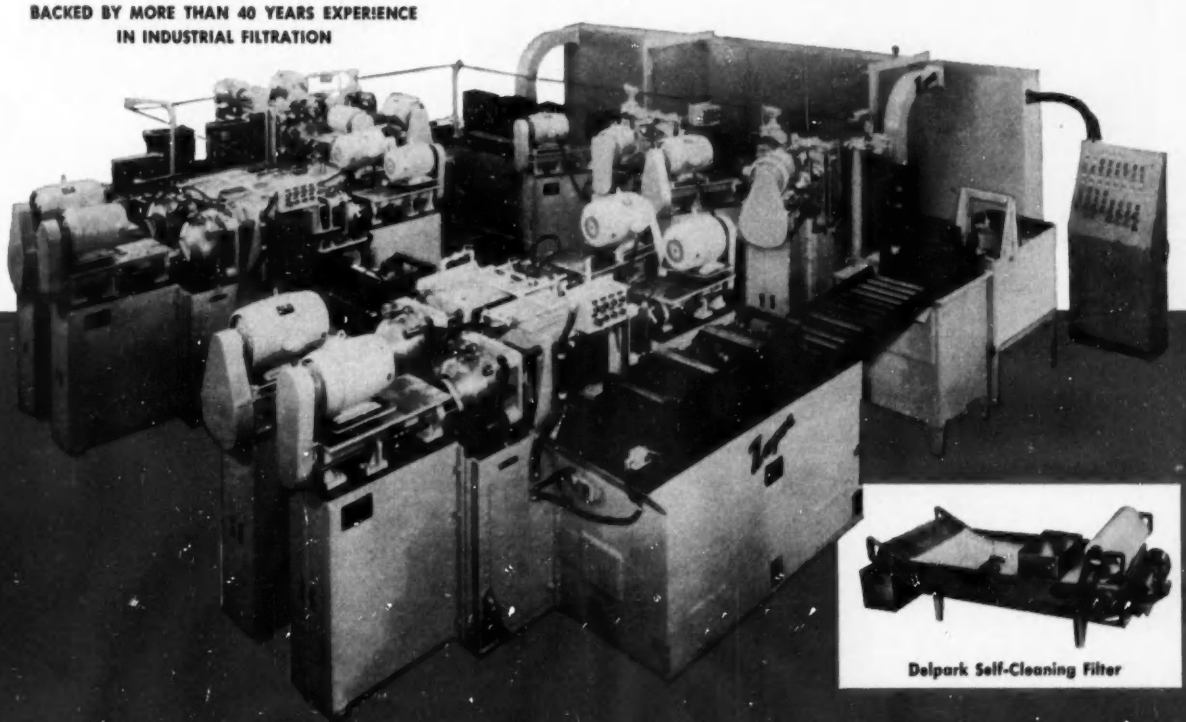
These Zagar pallet-type transfer machines at IBM perform numerous drilling operations on aluminum frames for the famous IBM typewriters.

Here is a fine example of Automation . . . and backing up this unit is automation in filtration. You won't see it in the picture, but . . . Delpark filtration cleans coolant from the 206 drill spindles. Greater accuracy of drill hole size, longer drill life, more efficient tool operation are but a few of the major savings gained through Delpark filtration. Delpark is one reason why up to 144 parts per hour are handled on this unit with but two operators. Credit IBM and Zagar tool engineering for foresight . . . credit IBM tool service for production know-how . . . credit Delpark for filtration as modern as today's automation.

For your filtration problems . . . for automation or normal procedure . . . contact Delpark for competent field engineering. There's no obligation. *Write today.*

DELPARK INDUSTRIAL FILTRATION

BACKED BY MORE THAN 40 YEARS EXPERIENCE IN INDUSTRIAL FILTRATION

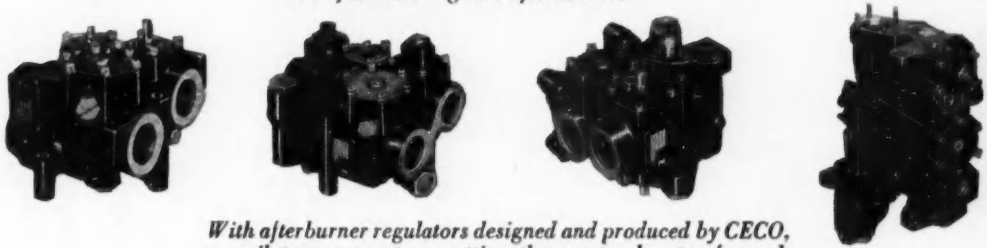


Delpark Self-Cleaning Filter

INDUSTRIAL FILTRATION COMPANY, 19 INDUSTRIAL AVENUE, LEBANON, INDIANA

UP AND AT 'EM
CECO

When the need arises, our jets must get up and at 'em fast . . . airborne and on the way to intercept within seconds of the first radar alert. The added power to thrust several tons of fighting craft into the air in a hurry — to supply "throttle-burst acceleration" for delivering the knock-out punch — comes from the engine's afterburner.



With afterburner regulators designed and produced by CECO, our pilots can count on getting those extra bursts of speed . . . power in a pinch . . . when needed most. And from the CECO engineering-production team you can count on jet-engine components designed and built to meet your most exacting requirements.

CHANDLER-EVANS

DIVISION NILES-BEMENT-POND COMPANY

WEST HARTFORD 1, CONN., U.S.A.

PIONEER PRODUCERS OF

JET ENGINE FUEL CONTROLS • AFTERBURNER CONTROLS
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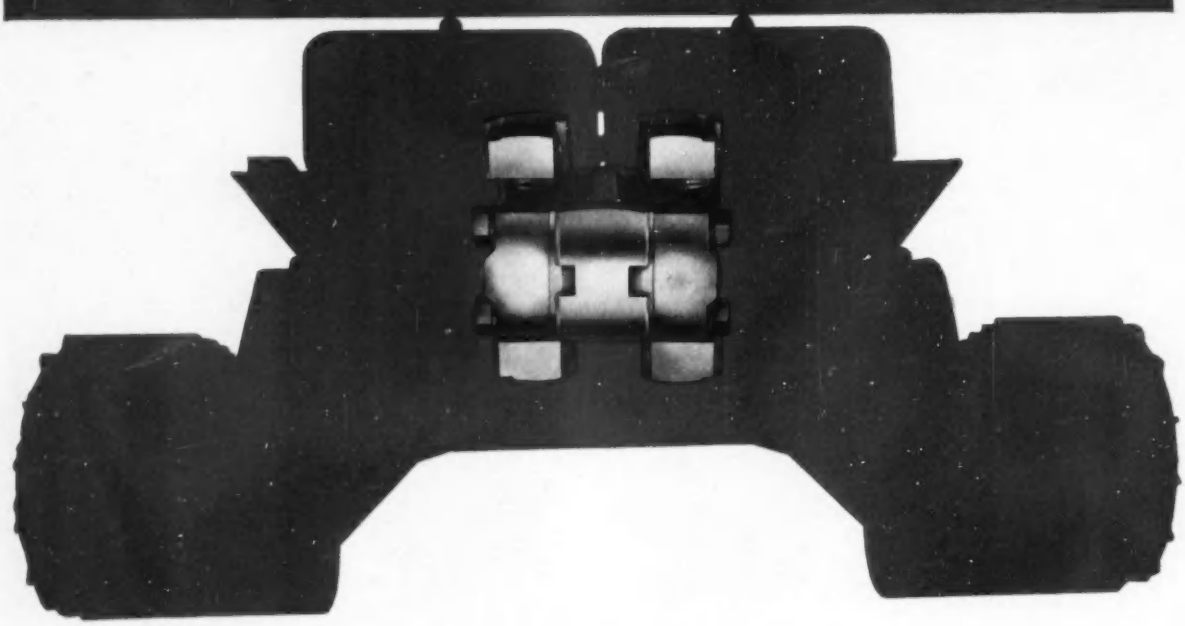
COMPACT



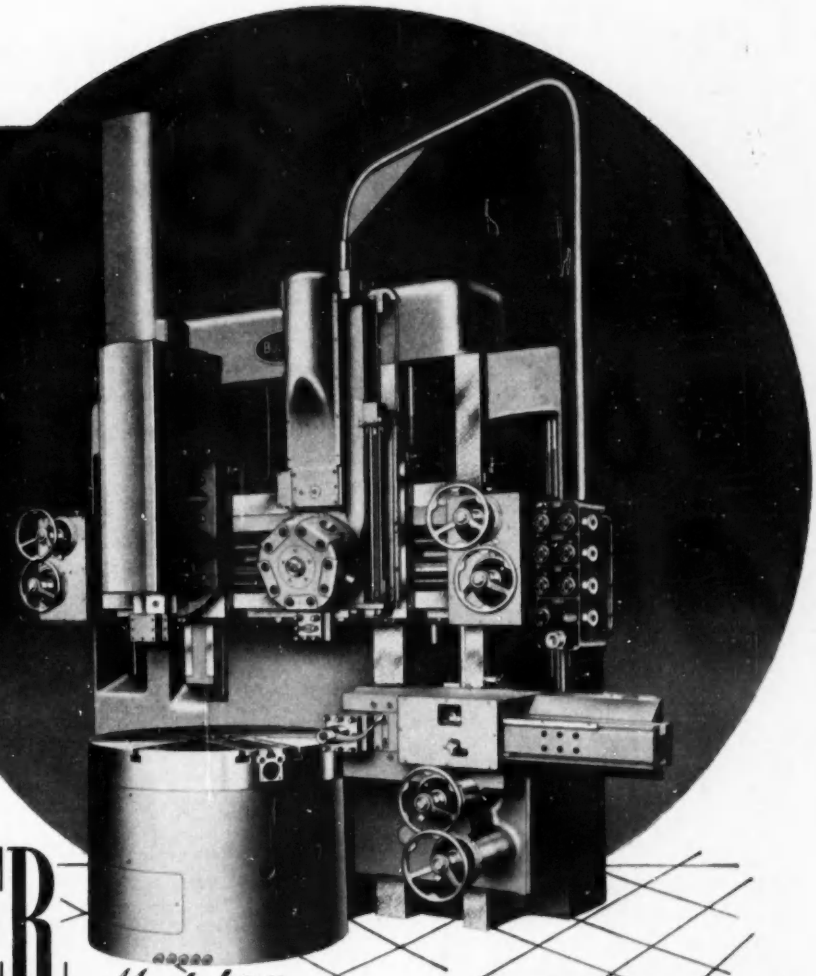
MECHANICS close-coupled type Roller Bearing UNIVERSAL JOINTS are specially designed for operation within cramped quarters, and where shafts are out of alignment — as in twin-tractor power unit silhoutted above and in rear engine cars, tractors, trucks and busses. Let our engineers show you how these MECHANICS joints will conserve space and compensate for offset shafts, in your new models. These joints fit into spaces that engineers formerly considered too short for universal joints. Our new catalog — showing complete line of MECHANICS Roller Bearing UNIVERSAL JOINTS and containing handy joint tracing kits — will be sent to manufacturers, upon request.

MECHANICS UNIVERSAL JOINT DIVISION
Borg-Warner • 2024 Harrison Ave., Rockford, Ill.

MECHANICS
Roller Bearing BW
UNIVERSAL JOINTS

For Cars • Trucks • Tractors • Farm Implements • Road Machinery • Aircraft • Tanks • Busses and Industrial Equipment

It's Here...



the NEW CUT MASTER *Model 75*

BULLARD

A COMPLETELY NEW DESIGN OF VERTICAL TURRET LATHE

This new line has been engineered and designed to take full advantage of the latest improvements in cutting tools, methods and materials.

Here are some of its features:

★ **PENDANT CONTROL,** exclusive Bullard design, for maximum machine control from a movable pendant station. Start and stop spindle; selection of speeds, feeds and directional movement of all heads in feed or traverse are quickly and easily accomplished from the Pendant. Interlocks and a stop-all stick provide safety for both operator and machine.

★ **ELECTRIC CONTROL PANEL** – Accessible yet concealed and protected from oil, dust and other foreign matter.

★ **IMPROVED CUTTING COOLANT SYSTEM** – Adjustable conductors with flexible hoses for channeling coolant directly to cutting tools and adjustable heavy gauge steel guards designed for easy chip removal.

★ **POWER INDEXED MAIN TURRET**–(Optional)

Available in 26, 36, 46, 56, 66 and 76 inch sizes for shipment to you early in 1955.

For the complete story use this coupon for your copy of the new catalog.

THE BULLARD COMPANY

286 Canfield Avenue • Bridgeport 2, Connecticut

Please send me a copy of the new Bullard Cut Master Vertical Turret Lathe Model 75 Catalog today.

NAME .....

COMPANY ..... POSITION .....

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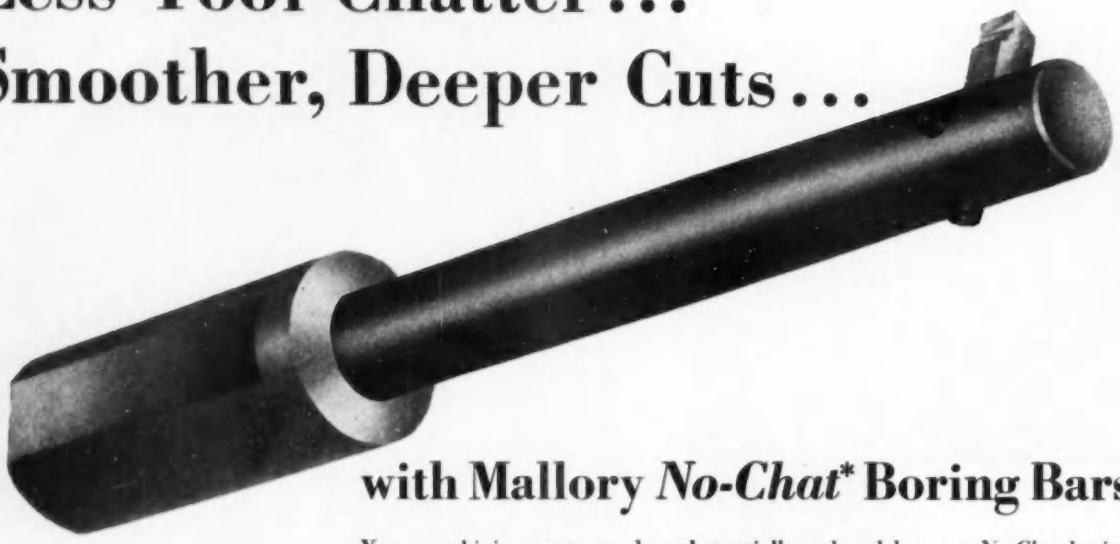
Less Tool Chatter...
Smoother, Deeper Cuts...



with Mallory *No-Chat** Boring Bars

Your machining costs can be substantially reduced by new *No-Chat* boring bars—a revolutionary development of Mallory research that practically eliminates tool chatter.

No-Chat boring bars . . . and tool shanks . . . are made of a completely different kind of alloy whose physical characteristics inherently stop tool vibration at its source. Twice as heavy and 75% more rigid than steel, they produce smoother finish even on deep cuts. Their higher price is repaid quickly, many times over, by these cost-cutting advantages:

HEAVIER CUTS—Because chatter is greatly reduced you can set machines to remove more metal per pass.

SMOOTHER FINISH—Clean cuts often require no finish grinding.

LONGER LIFE BETWEEN GRINDS—Cutting edges last longer, due to reduction of vibration. And tools run cooler, for the *No-Chat* tool conducts heat away from the tip three times as fast as steel.

EASY BRAZING—Cutting tip can be brazed readily to the bar with any of a variety of brazing alloys. *No-Chat* is non-annealing . . . eliminates grain growth problems.

RE-USABLE—*No-Chat* boring bars or tool shanks can be used over and over with new tips.

We'll be glad to discuss how this new idea in machine tool technology can put new performance into the tools you use or manufacture. Write today for our Technical Bulletin.

TESTS PROVE HOW *NO-CHAT* REDUCES CHATTER

These oscillograms show the greatly reduced amplitude of tool vibration with *No-Chat* shanks, using identical machine set-ups, when taking a 0.030" cut in low carbon cold rolled steel at 450 SFPM.

With ½" steel shank and style C-8 bit.

With ½" *No-Chat* shank and style C-8 bit.

*Trade Mark

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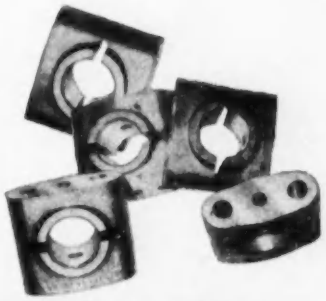
AUTOMATED BROACHING

BALANCED PRODUCTION

with two machines



ANOTHER

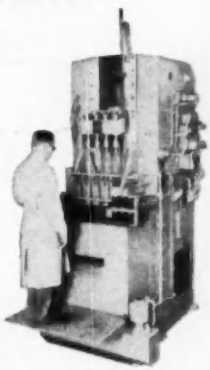
American

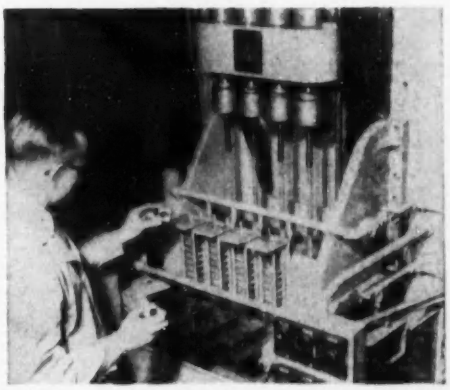
FIRST

This "working team" of two American Broaching Machines produces 3,000 rocker arm brackets per hour.

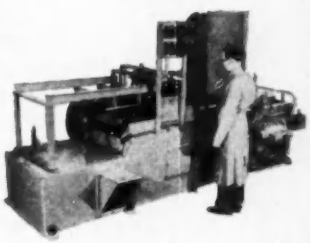
An American (VP) vertical hydraulic internal pull-up broaching machine, arranged for 4-station operation, broaches the ¾" diam. hole in the part. The part is then conveyed to a hydraulic broaching machine, which straddle broaches the sides of the parts. The feeds, broaching strokes and ejectors of the two machines are completely automated to provide continuous, balanced production.

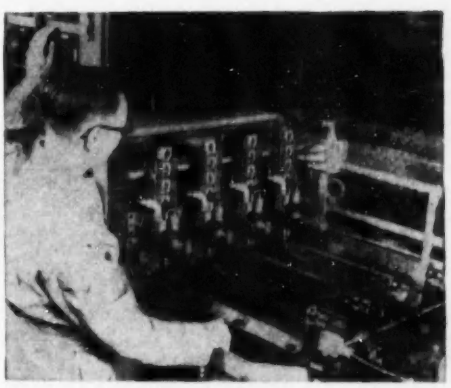
American machines, broaches and fixtures are made in sizes and types to fit your exact requirements. Why not let American engineers solve your broaching problems. Send a part print or sample. Ask for Catalog No. 450.



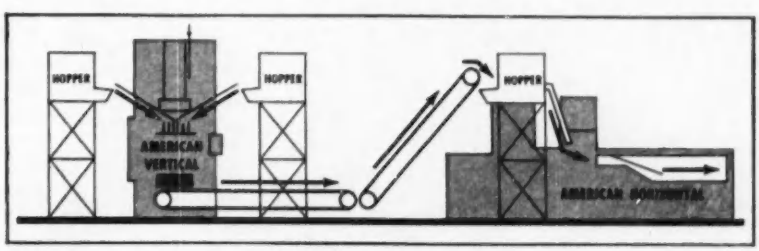


At the vertical machine, the die-cast aluminum parts are fed from hoppers into magazine feeds, the hole is broached and the parts automatically ejected onto a conveyor. Cycle is continuous.





Expanding arbors of the horizontal machine pick up the parts from magazine feeds and push them past stationary broaches which straddle broach the sides. Parts are ejected automatically on the return stroke.



American BROACH & MACHINE CO.

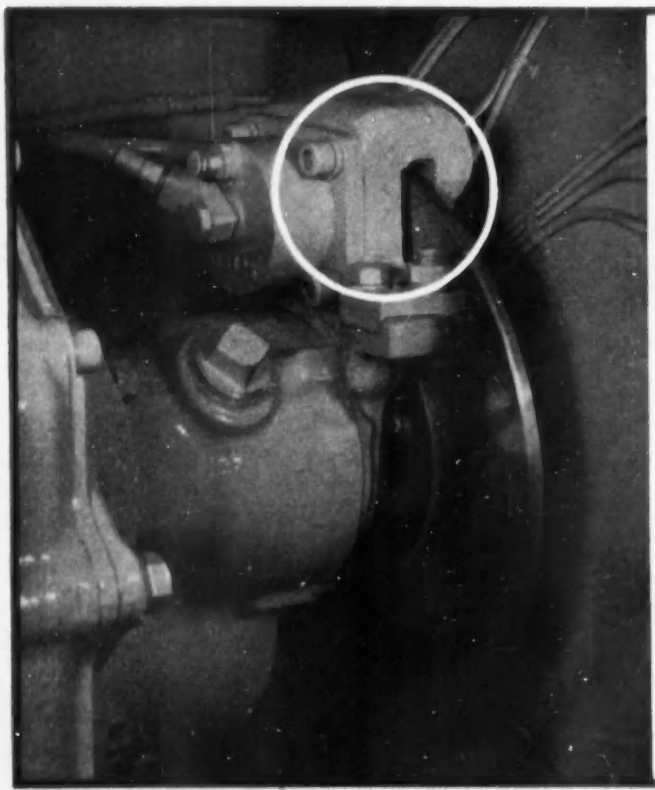
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

ANN ARBOR, MICHIGAN

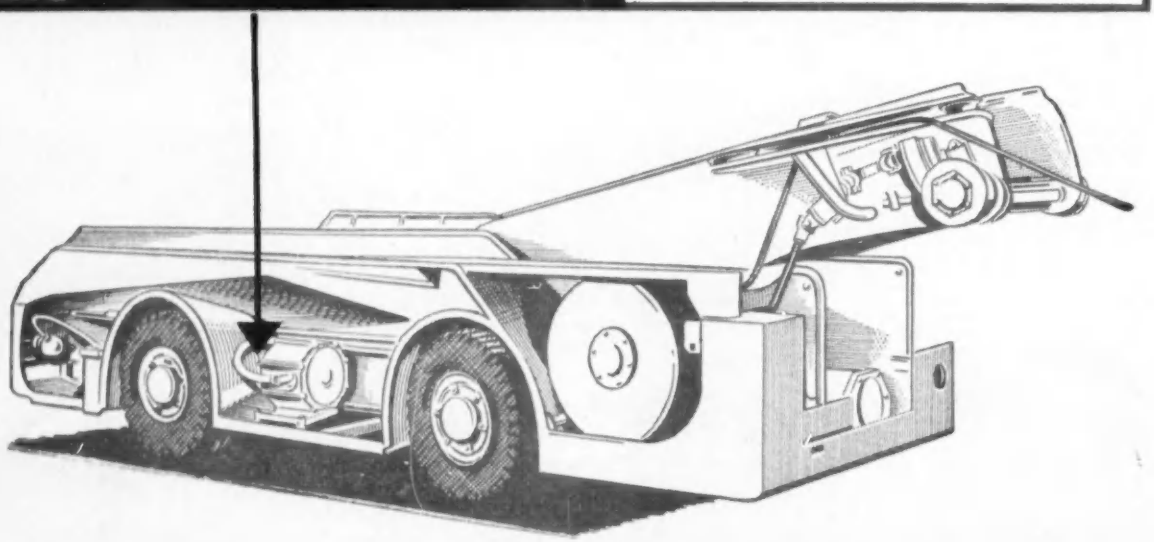
See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

R/M

FIRST IN FRICTION

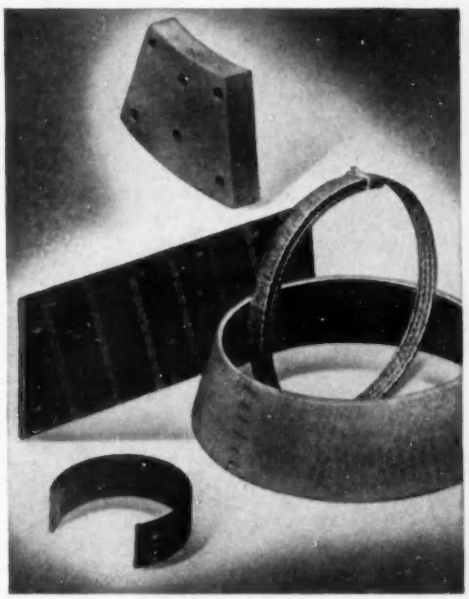


To give this cable reel shuttle-mine car reliable stopping power, R/M designed and made the sintered metal friction disc illustrated here. Two of these vitally important parts are employed on each of two disc brake assemblies. The performance they are rendering is outstanding.



THE TRADE-MARK THAT SPELLS PROGRESS IN FRICTION MATERIAL DEVELOPMENT!

The sintered metal brake part described on the opposite page typifies the hundreds of friction material products Raybestos-Manhattan has developed for specialized applications. Throughout industry in general R/M is recognized for its ability to solve tough design and manufacturing problems involving friction materials. If you have such a problem, remember that R/M has had a wealth of experience working with countless combinations of different types of friction materials . . . woven and molded asbestos, semi-metallic materials, and sintered metals . . . is constantly achieving outstanding results. Your problem could very well be one that R/M has already attacked and solved. In any case, you will find your R/M representative helpful. Call him in and get the advantage of working with a man who has the world's largest maker of friction materials behind him.



R/M's complete line of friction materials includes woven and molded asbestos parts in the form of blocks, segments, discs, cones, collars, and many special shapes.

New and very useful!—R/M Bulletin No. 500. Write for your free copy. Its 44 pages are loaded with practical design and engineering data on R/M friction materials.

RAYBESTOS-MANHATTAN, INC.

EQUIPMENT SALES DIVISION: 6010 Northwest Highway, Chicago 31, Ill.

Detroit 2 Cleveland 14 Los Angeles 58

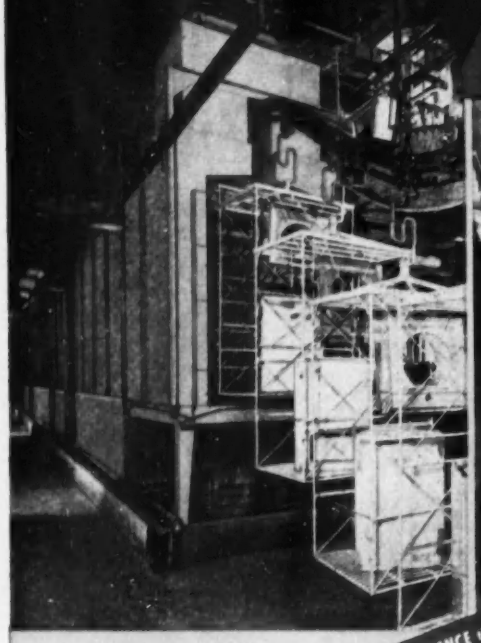
Factories: **Bridgeport, Conn. Manheim, Pa. Passaic, N.J. No. Charleston, S.C. Crawfordsville, Ind. Neenah, Wis. Canadian Raybestos Co. Ltd., Peterborough, Ont.**

RAYBESTOS-MANHATTAN, INC., Brake Linings • Brake Blocks • Clutch Facings • Fan Belts Radiator Hose • Industrial Rubber, Engineered Plastic, and Sintered Metal Products • Rubber Covered Equipment • Asbestos Textiles • Packings • Abrasive and Diamond Wheels • Bowling Balls

R/M FIRST IN FRICTION

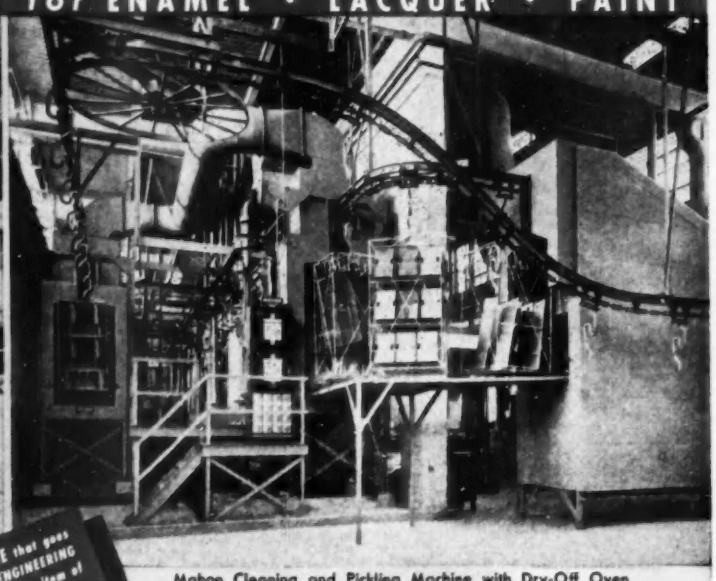
COMPLETE *Finishing* SYSTEMS

for ENAMEL • LACQUER • PAINT

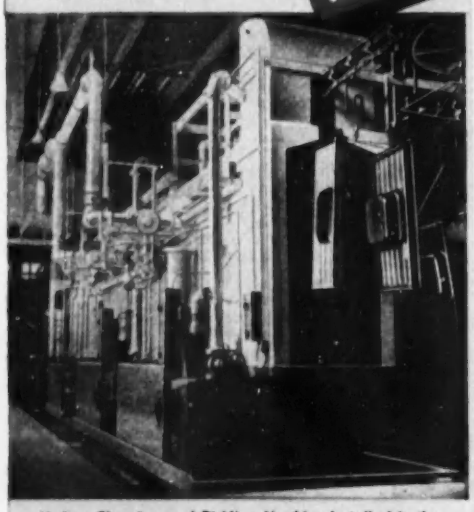


Mahon Cleaning and Pickling Machine Installed as Part of a Complete Finishing System for one of the World's Largest Household Appliance Manufacturers.

. . . the EXPERIENCE that goes into the PLANNING and ENGINEERING of MAHON EQUIPMENT is the item of GREATEST VALUE to YOU!



Mahon Cleaning and Pickling Machine with Dry-Off Oven Installed in the Plant of a Leading Electric Range Manufacturer.



Mahon Cleaning and Pickling Machine Installed in the Plant of a Manufacturer of Porcelain Enameled Kitchen Sinks and other Units of Plumbing Ware.

Now, PICKLING OPERATIONS can be included in your CONVEYORIZED FINISHING SYSTEM!

Pickling operations no longer require a separate room with elaborate ventilating, fume control, and air replacement equipment. Cleaning and Pickling, preparatory to porcelain enameling, can now be done on the same overhead monorail conveyor that carries parts through other processing units of your conveyorized production finishing system. Pickling can be done in one third the time with more uniform results in a modern Mahon conveyorized spray-impingement Pickling Machine. All this is made possible by a Patented Hydro-Hermetic Seal on the Mahon Pickling Machine which effectively seals the top of the processing tunnel and provides positive protection for the conveyor track, trolleys and chain . . . no corrosive fumes can escape to damage conveyor parts. Sixteen of these Mahon Pickling Machines are now in operation in plants where descaling, pickling and rust proofing are necessary phases in the finishing process. Mahon Cleaning and Pickling Machines can be fitted right into your present finishing production system . . . they can be designed to meet any existing layout, processing requirement or production rate. Have a Mahon engineer call and give you complete information . . . and, let him tell you where and how a Mahon Conveyorized Spray Pickling Machine will cut costs in your present setup. See Sweet's Plant Engineering File for other Mahon Industrial Equipment, or write for Catalog A-655.

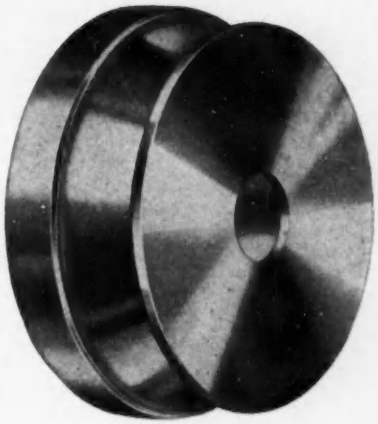
THE R. C. MAHON COMPANY

HOME OFFICE and PLANT, Detroit 34, Mich. • WESTERN SALES DIVISION, Chicago 4, Ill.

Engineers and Manufacturers of Metal Cleaning and Pickling Equipment, Metal Cleaning and Rust Proofing Equipment, Spray Booths, Flow and Dip Coaters, Drying and Baking Ovens, Complete Conveyorized Finishing Systems, and Other Units of Special Equipment.

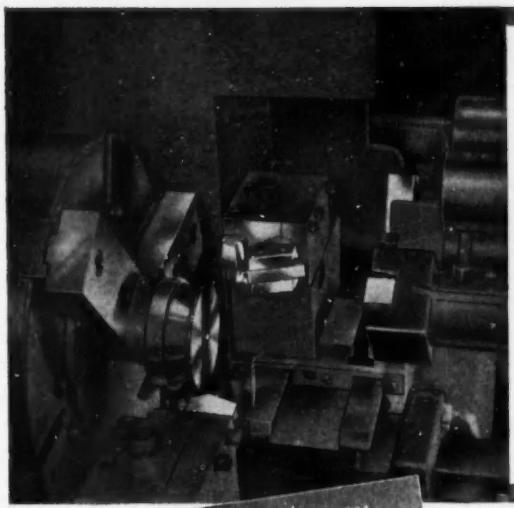
MAHON

CUTTING SPEEDS OVER 1,000 Feet per Minute on STAINLESS STEEL FORGINGS

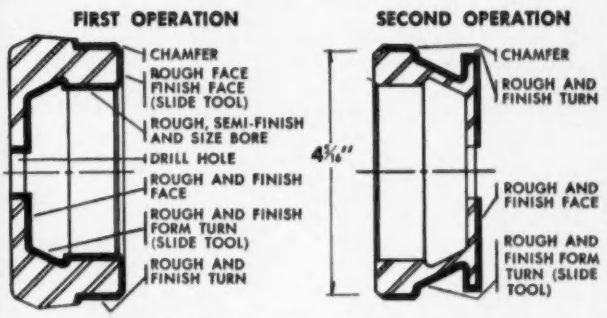


WITH THE NEW

POTTER & JOHNSTON 4-U AUTOMATIC



HERE ARE THE RESULTS!!



HEAVY LINES INDICATE MACHINED SURFACES

FLOOR-TO-FLOOR TIME, 5.54 minutes per piece (for both operations)

34 PRACTICAL PRODUCTION IDEAS
TO HELP YOU INCREASE OUTPUT AND REDUCE COSTS
MODERNIZE with POTTER & JOHNSTON REPLACE FOR PROFIT

Performance like this is ***typical*** of the extra speed, output and economy you can expect with the new P&J 4-U Automatic. Designed and built specifically to handle today's tough alloys with greater efficiency, this rugged workhorse has the added power, spindle speed and rigidity needed to take ***full advantage of modern carbide tooling*** for faster metal removal.

Investigate this important opportunity for greater efficiency and increased profits. Send now for your free copy of the 4-U Circular and the "34 Ideas Booklet" to help you increase output and reduce costs.

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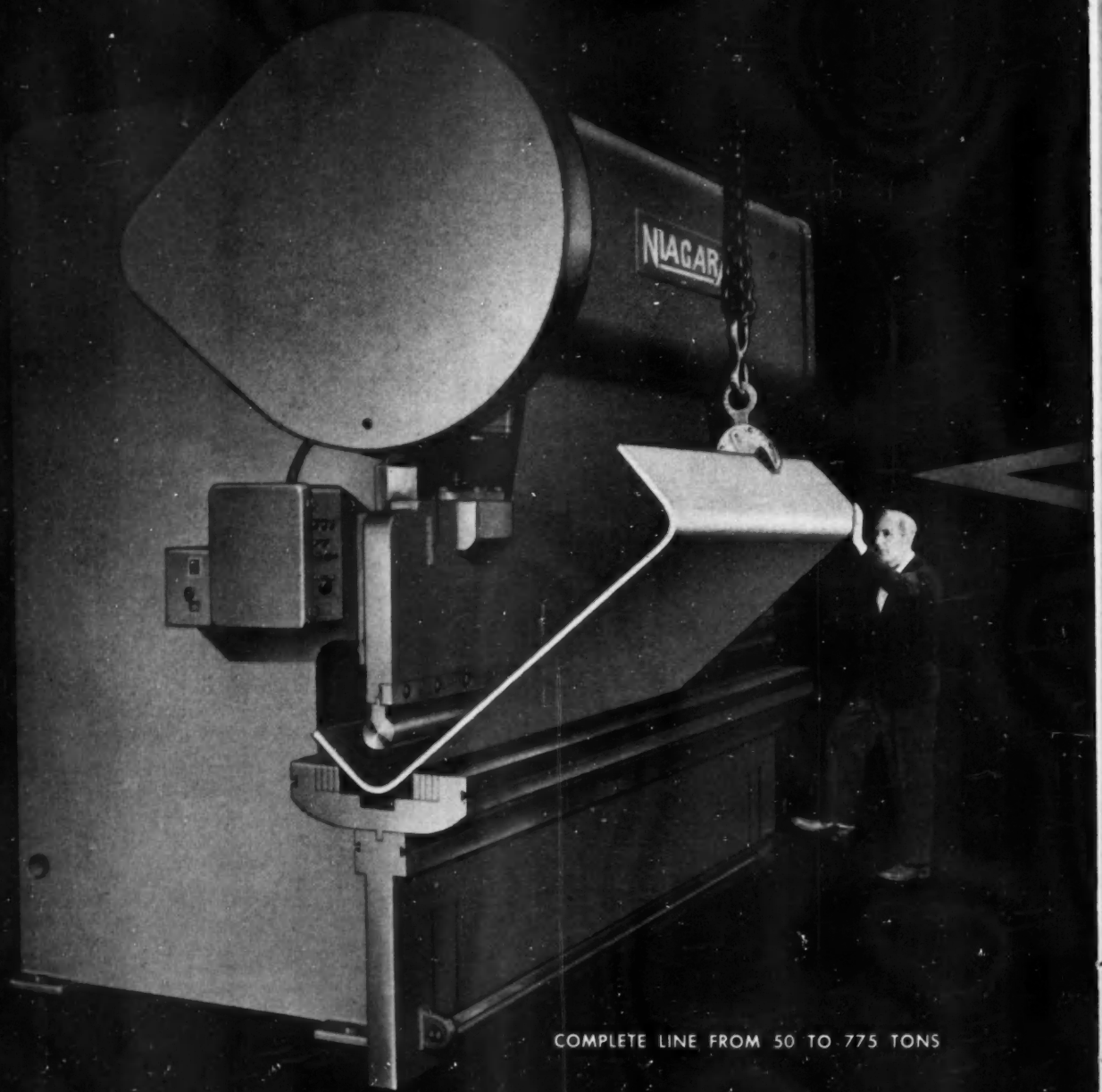
PRECISION PRODUCTION TOOLING FOR MORE THAN FIFTY YEARS

IT'S THE NEW, "YEARS-AHEAD" LINE ...

Far out front on every point of comparison



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NIAGARA MACHINE & TOOL WORKS 1879 76 1954

America's Most Complete Line of Presses, Shears, Machines and Tools for Plate and Sheet Metal Work

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ALL STEEL PRESS BRAKES

"MULTI-MACHINE" VERSATILITY TO BOOST PRODUCTION

Practically limitless in their scope of forming, bending, punching, blanking and related operations, Niagara Press Brakes get more done for you because they do more jobs. One reason: Advanced design. Another: The extensive line of Niagara Press Brake Dies available.

UNIFORM BENDS WITH STRAIGHT-EDGE ACCURACY

Double end twin drives with double reduction gearing, *on all models*, provide uniform, constant application of power at both ends of the ram. Off-center loading presents no problem.

Rugged, streamlined frames feature box type crowns of unequaled strength and rigidity, assuring maximum resistance to deflection and permanent alignment of bearings and ram.

3-SHIFT STAMINA TO HANDLE WORK-HEAVY SCHEDULES

Close attention has been given to every design detail. Nothing has been overlooked. Each frame size has been scientifically tested to detect and eliminate harmful stresses at all critical points.

Laminated non-metallic ways, an exclusive Niagara feature, reduce wear to an absolute minimum, providing accurate alignment and longest possible service life. All gearing is totally enclosed in sealed oil baths for thorough, clean lubrication.

Once again, Niagara's forward-thinking engineering has produced a metal working machine years ahead of its time. As you become familiar with the significant developments embodied in this revolutionary new line of all steel press brakes, you will realize why it carries the Niagara nameplate. After all, who is more uniquely qualified to be its builder than the builder of America's most famed and most complete line of presses, shears, other machines and tools for plate and sheet metal work?

Call in your nearest Niagara representative at once. Let him tell you, *in detail*, what these great, new press brakes can do for you.

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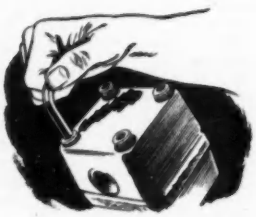
Four UNBRAKO Socket Head Cap Screws speed assembly in the plant, and reassembly in the field, of these flow-control valves providing 16 different inlet-outlet flow direction combinations.

The knurling on the head of the screw permits faster assembly, because it provides a slip-proof grip.



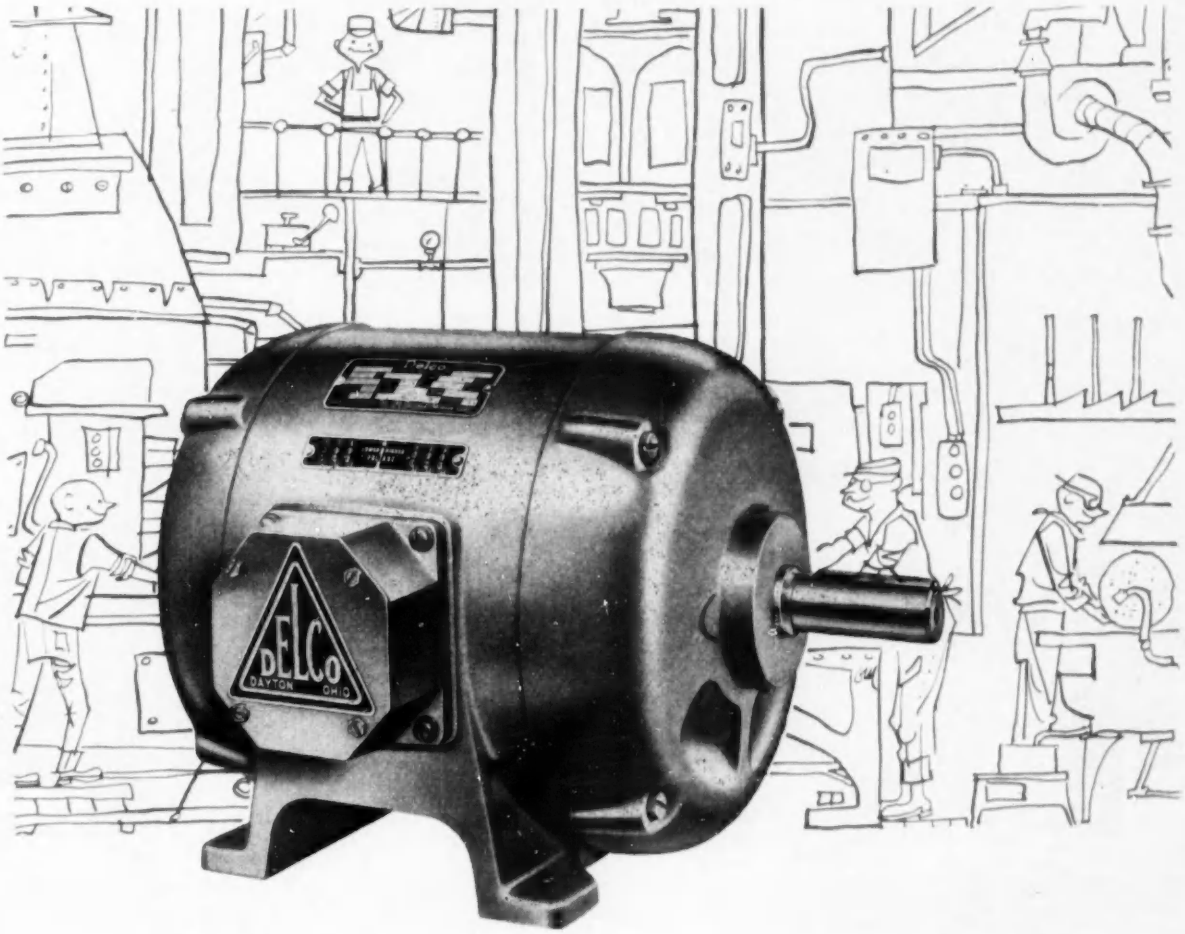
The uniform depth and size of the hex socket assure maximum torque in wrenching. The accurate diameter of the head permits countersinking.

UNBRAKOs—made of heat treated alloy steel—have fully formed threads, Class 3 fit; controlled fillet and continuous grain flow for strength. Supplied in standard sizes from # 4 to 1".

Get personalized service, faster delivery with UNBRAKO Standards—stocked by your distributor

When you use UNBRAKO socket screw products, you get the finest socket screws made, *plus* the personalized service and the faster delivery of your local distributor. And he enables you to cut your inventory, set up more space for production. For more information, write for UNBRAKO Standards—a complete listing of precision socket screw products carried by your distributor. STANDARD PRESSED STEEL CO., Jenkintown 53, Pa.

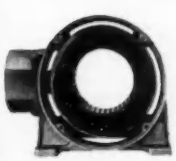
UNBRAKO SOCKET SCREW DIVISION SPS JENKINTOWN PENNSYLVANIA



Here's a new line of... **DELCO**

OPEN FRAME BALL-BEARING MOTORS

Corrosive-resistant cast iron frame. Exclusive cotton and varnish insulation for permanent flexibility and long life.



Grease-lubricated shielded and sealed ball bearings are positioned to maintain permanent shaft alignment.

Rotor is die-cast aluminum, dynamically balanced in unit with shaft to reduce vibration.

New NEMA frame sizes—the major design feature of these greatly improved Delcos—offer users more power in less space, with less noise, less weight, and better appearance. Yet with all these new advantages, there's no sacrifice of performance or electrical characteristics! These are the motors you can order *now* in frame sizes 182 and 184—and get in a hurry. Larger frame sizes—to 326—will be available later. Also, there are new totally-enclosed fan-cooled motors in frame sizes 182 and 184 available now. These two new lines are compact . . . lightweight . . . quiet.

Previous frame sizes will continue to be available

DELCO PRODUCTS
DIVISION OF GENERAL MOTORS CORPORATION
DAYTON 1, OHIO

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DISTRIBUTED BY WHOLESALERS EVERYWHERE

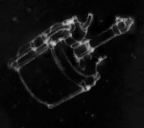
Bendix power

STEERING AND BRAKING

sells more cars

satisfies more customers

Today's most wanted power features for cars and trucks



Bendix * low pedal POWER brake

Specified by more car manufacturers than any other make, Bendix Low Pedal Power Brake makes possible quick, sure stops by merely pivoting the foot from stop-and-go controls. No need to lift the foot and exert leg power to bring the car to a stop. Result—more driving comfort, less fatigue and greater safety!

Bendix * POWER steering

Because Bendix Power Steering is of the linkage type, vehicle manufacturers find it especially adaptable for production line installation, without extensive engineering changes. Manufacturers can now meet the increasing demand for power steering more efficiently and more economically with Bendix Power Steering.

Bendix HYDROVAC* POWER brake

With over four million in use, the Bendix Hydrovac is by all odds the world's most widely used power brake for commercial vehicles. This overwhelming preference for Hydrovac is a result of sound engineering design, exceptional performance, low original cost and minimum service upkeep.

Bendix AIR-PAK* POWER brake

With one simple compact unit, Bendix Air-Pak combines all of the well-proven advantages of hydraulic brake actuation with an air brake system. An important advantage of Air-Pak is that brakes can be applied by foot power alone when braking is required before air pressure builds up or if it should fail for any reason.

*REG. U.S. PAT. OFF.

The term "Bendix Power" not only identifies the industry's outstanding power braking and power steering equipment, but describes the unmatched engineering and manufacturing resources behind these products.

It is well that Bendix Products Division be thought of in this dual capacity, for the outstanding acceptance of Bendix power units stems largely from the fact that industry has learned over the years to look to Bendix for the latest and best in power equipment for cars, trucks and buses.

Bendix Products Division

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Bendix AVIATION CORPORATION

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AUTOMOTIVE INDUSTRIES

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High Spots of This Issue

★ Paris Automotive Show Attracts 1300 Exhibitors

The lack of widespread mechanical changes detracted little from the interest shown in the vehicles on display at the recent Paris Show with its strong international flavor. Highlights of the exposition are reviewed here. Page 48.

★ Chevrolet Completely New for 1955

Featuring a new V-8 engine, chassis, and body, plus other important mechanical changes. Chevrolet has gone all out to capture the car buyer's dollar in its 1955 line. The numerous innovations are minutely analyzed. See Page 52.

★ Pontiac for 1955 Has V-8 Engine and New Styling

Another thoroughly redesigned offering in the 1955 GM series is the Pontiac. Low and streamlined body, in addition to a new OHV V-8 engine, will make this car a strong competitor in the sales race to come. Page 58.

★ Packard 1955 V-8's in Production

A sum in excess of $20 million has been spent for new equipment to produce two new Packard V-8 engines. Presented in this article is a guided tour of the new facilities at the engine plant in Utica, Mich. See Page 62.

★ Engineering Trends in British Commercial Vehicles

While no general radical changes were noted in the vehicles exhibited at the London Commercial Motor Show, an increasing use of small Diesels was evident. This trend and others are discussed in the story. Page 70.

★ 35 New Product Items And Other High Spots, Such As:

Defense plane production among topics panelized at SAE Aeronautic meeting and latest vehicles of Communist satellites.

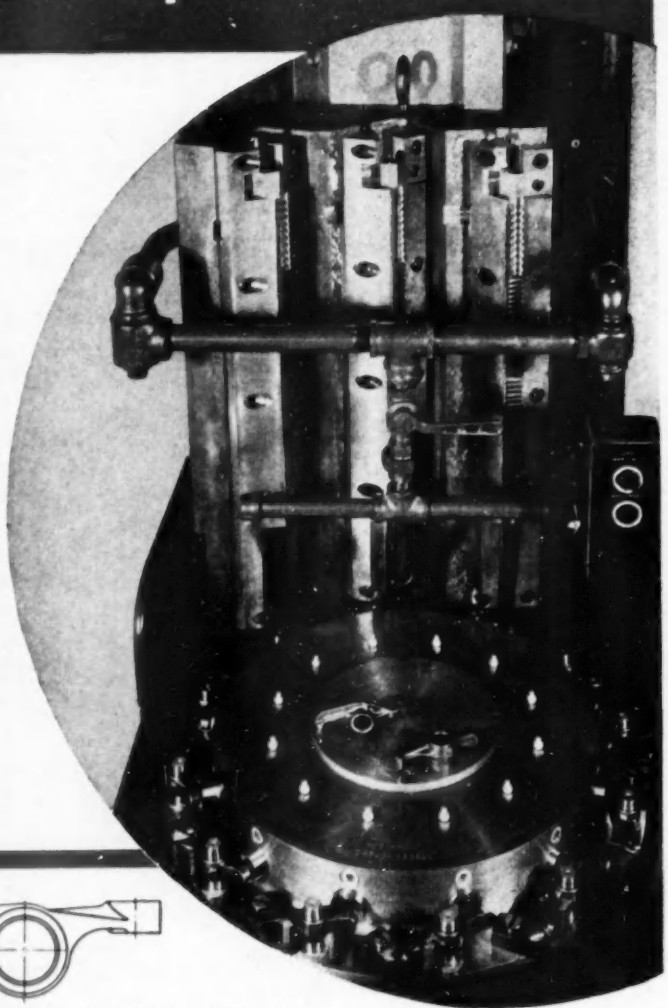
Automotive and Aviation News, Page 33
Complete Table of Contents, Page 3

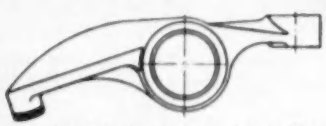
AUTOMOTIVE INDUSTRIES COVERS
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY • PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

Complete Production Package by Cincinnati Can Help You Reduce Costs

The equipment illustrated here is highly productive because it's largely automatic. The operator merely removes the broached parts and reloads the fixture as it automatically indexes in front of him. 1550 parts are broached per hour. ¶ To attain this high rate of production, Cincinnati Application Engineers tooled up a CINCINNATI No. 5-42 Single Ram Vertical Hydro-Broach Machine with a three unit broach holder, for broaching three parts each stroke of the ram. The machine table is replaced with a hydraulic index fixture which holds twelve parts. Clamping is automatic. The operating cycle repeats continuously: broach three parts, index 31°, return ram, index 59°. This equipment is a high production, low-cost installation, safe and easy to operate. It is typical of the many complete production packages engineered and built by Cincinnati. You may obtain the benefits of Cincinnati Engineering Service by sending drawings and manufacturing data to us.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

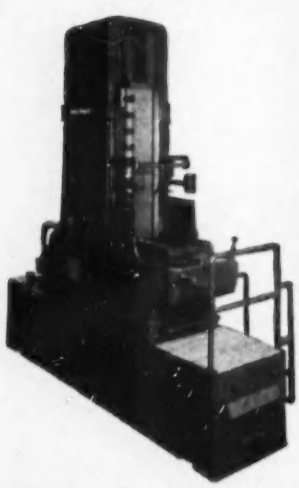




Drawing of part. Heavy line indicates broached surface.

PRODUCTION DATA:

Part Name	Valve rocker arm
Material	Steel forging
Operation	Broach convex pad
Production	1550 per hour
Equipment	CINCINNATI No. 5-42 Single Ram Vertical Hydro-Broach Machine with built-in automatic fixture



CINCINNATI No. 10-66 Single Ram Vertical Hydro-Broach Machine. Seven sizes are available. Write for new catalog No. M-1745.

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News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 111, No. 9 November 1, 1954

Chevrolet To Use Part Of Willow Run Plant

When Chevrolet completes construction of its new parts and accessories building at the Willow Run plant, which GM purchased from Kaiser last year, it will have an additional one million sq ft of space for this facility. The division will lease 896,400 sq ft from another GM division and will add a new construction later occupying 125,000 sq ft.

The new facility will serve as a major supply depot for Chevrolet's Parts and Accessories Dept., and employment there may eventually reach 1000. There are at present 85 Chevrolet employees at Willow Run, which is occupied mostly by the GM Hydra-Matic transmission plant. GM purchased the plant after its Livonia, Mich., Hydra-Matic unit was destroyed by fire last year.

Trucks and Diesel Engines To be Turned Out in Mexico

The Mexican Dept. of National Economy has announced that Diesel Nacional, S.A., will start functioning in Irolo, Hidalgo, shortly. The firm will produce engines and freight trucks, with a total capacity of 5000 units. First year's production will be 1000 trucks and 4000 Diesel engines.

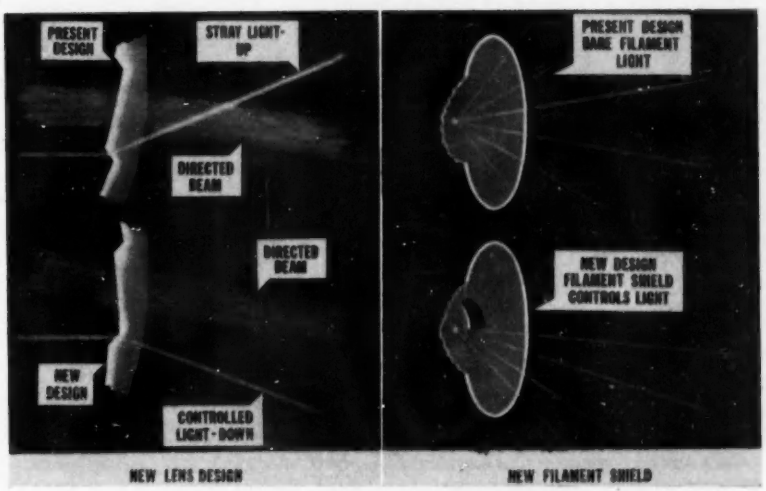
GM Lays Out $182 Million For Expansion in Europe

A $3.5 million expansion program at the General Motors' Bienne, Switzerland, subsidiary brings the total outlay that the corporation has approved for its European plants since last June to more than $182 million.

In a two-week tour of Europe which he just concluded, Harlow H. Curtice, GM president, announced expansion programs totaling more than $111 million. In addition to the most current programs, a $71.425 million expansion has been underway at Opel in Germany since last June. During the last several weeks, the corporation has approved expenditures of $101 million for its plants in England; $6 million in Belgium; and $3.5 million in Switzerland.

The Bienne program will help the GM subsidiary there double its assembly capacity. When it is completed early in 1956, the plant will have an additional 200,000 sq ft of floor space and provide employment for 200 more workers.

GM predicts that Switzerland, Austria, and other countries served by the plant will absorb at least 80,000 more motor vehicles a year by 1960. This would be 13,000 more than are expected to be sold this year.



BETTER LIGHTING LIES AHEAD FOR 1955

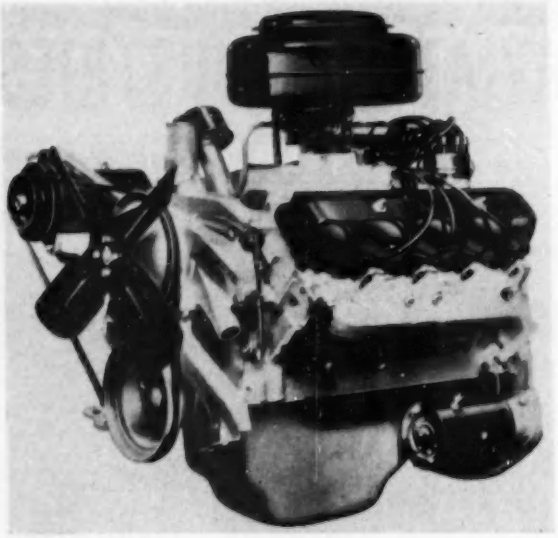
Automobile and truck manufacturers will adopt as standard equipment some time during 1955 the new improved sealed beam headlamps illustrated above. Interchangeable with current sealed beam units, they are expected to be available in the replacement market shortly after the first of the year. Primary advantages are said to be: increased wattage; opaque shield over the filament; higher aiming; greater visual distance, particularly at right-hand side of road; reduction in glare; and various optical improvements to afford better vision for safer driving at night.

Ford Building Annex To Engineering Unit

When Ford Motor Co. completes construction of a one-story annex to the Engineering Staff Administration Building in Dearborn next year, it will provide 156,000 sq ft of additional space for office and shop activities. Part of a multi-million dollar expansion program in that area, which will eventually include three other new buildings, the new unit will accommodate several key activities of the company.

Among the foregoing will be transmission and axle engineering, truck engineering, and a special Military Vehicles Dept. It will also house engine inspection and assembly operations and a portion of the Administrative Services Dept.

News of the AUTOMOTIVE



1955 Plymouth Hy-Fire V-8 engine.

Chrysler Looks to More Powerful Engine Family, Dramatic Styling to Recoup Share of Market

Hitting the "comeback" trail with a $250 million investment in dies, jigs, fixtures, etc., Chrysler Corp. exhibited at a special press preview last month the new line of 1955 cars with which it hopes to regain and even surpass its previously held 20 per cent of the passenger car market. Estimating that total automobile production next year will total 5.3 million units, L. L. Colbert, Chrysler president, stressed that his company is going all out to capture its share of sales.

Mechanical Features

While complete descriptions of each car in the Chrysler line will appear in AUTOMOTIVE INDUSTRIES in accordance with the proper release dates, it is possible to mention in generalities some of their outstanding features. From a mechanical point of view, the biggest news lies in the new Plymouth Hy-Fire V-8 engine (see accompanying illustration).

Substantial power increases and improved fuel economy are also expected in six currently-offered engines being continued in the 1955 line. Although no specific power or torque figures were disclosed for any of the V-8 engines, it was stated that horsepower in certain lines would range as much as 50 per cent higher than in corresponding 1954 models.

Three newly designed V-8's offered for 1955 are the Chrysler Spitfire for the Windsor Deluxe models replacing the L-head Six; the Dodge Red Ram in the Dodge Royal and Coronet 8 series; and the Plymouth Hy-Fire V-8 available for all Plymouth models. The Plymouth and Dodge Coronet line will also offer improved six-cyl engines.

Other members of the Chrysler Corp. line for 1955—the Crown and Custom Imperials, Chrysler New Yorker De-Luxe, De Soto Fireflite and Firedome, and Dodge Custom Royal—all will feature revised versions of the hemispherical combustion chamber engines offered on 1954 models. For 1955, these will be designated as the Fire-Power (Chrysler Imperial and New Yorker); the Fireflite and Firedome (De Soto); and the Super Red Ram (Dodge Custom Royal).

Other new mechanical and safety features include redesigned suspensions and frames, improved brakes, full lines of power accessories, and automatic transmission selector level located on the instrument panel.

Styling Treatment

Longer, lower, and wider are the three words which best characterize the overall styling of the new 1955 Chrysler Corp. line. The Plymouth sedan, for example, is 10½ in. longer over-all, nearly two in. lower, and about one in. wider than the 1954 model.

Other styling features include: wrap-around windshields; open rear wheel housings and dual exhausts set in the rear bumper on the Chrysler Imperial; and flat, lower hood treatment, aircraft-type instrument panels and new type door handles on all cars.

New Continental Will Have Some Features of Original

Ford Motor Co. has officially confirmed that the name of the new super-plush car which it will introduce next year will be called the Continental. The car, which is expected to sell in the neighborhood of $10,000, will be produced by the newly organized Continental Div. of Ford Motor Co. Lincoln-Mercury, which produced the original Lincoln-Continental from 1940 to 1948, will have nothing to do with the new version.

The prototype Continental was conceived by the late Edsel Ford in 1938. A total of 5322 units was built before the company dropped it in 1948. The car was offered in two body styles and had a V-12 Lincoln engine.

The new model will be designed as a custom-built automobile and is expected to be produced in limited volume. While complete details about the car have not yet been revealed, several of the styling principles of the old Continental will be applied to new.

In its first activity last month (October), the new Continental Div. played host to the first annual meeting of the Lincoln Continental Owners Club, formed last year by some 500 Continental enthusiasts who were interested in exchanging information about their automobiles. More than 200 of the members were on hand at the Dearborn, Mich., program, which included a parade of the old vintage cars and presentation of awards to owners of the best-looking Continentals. Similar such activities will probably be held in the future.

AND AVIATION INDUSTRIES

British Gas Turbine Tank Is Put Through Test Paces

Demonstrated recently at Chertsey, England, was Britain's first gas turbine track-laying vehicle. The machine is powered by a two-shaft engine with a potential output of 1000 hp.

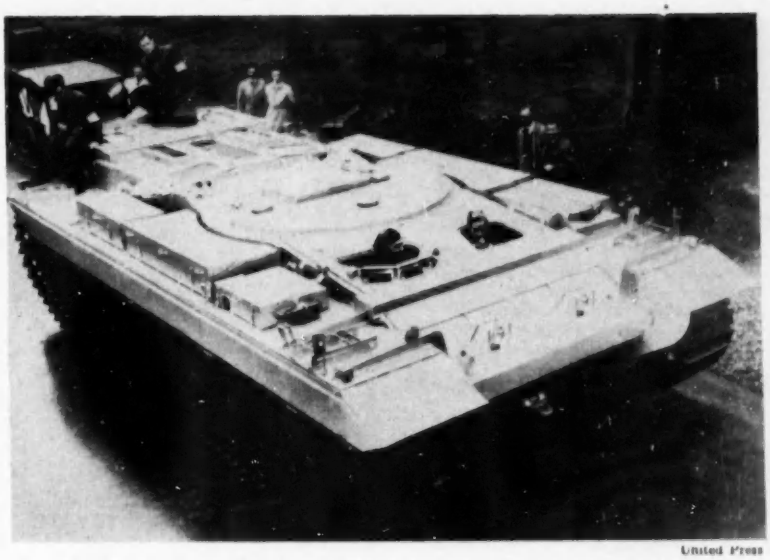
A single-stage centrifugal compressor is driven by a single-stage axial-flow turbine running at 17,500 rpm. The two-stage axial-flow power turbine runs at 9850 rpm, and a built-in reduction gear drops output speed to 2800 rpm.

A synchro-coupling unit, mechanically connecting the compressor and power turbines, is included to prevent over-speeding of the power turbine during gear changes. It also permits engine braking.

The multi-plate clutch is servo-assisted, and transmission is combined with the differential. Cooling air for the gearbox, oil coolers and breaking system is provided by a two-stage axial compressor.

Development of the vehicle was conducted by the Fighting Vehicles Research and Development Establishment of the Ministry of Supply. The gas turbine was built by C. A. Parsons & Co., Ltd.

This experimental unit, weighing 35 tons and based on an existing tank hull, is regarded as a mobile test bed instrument. It is expected to provide basic data for future gas turbine applications to wheeled and tracked vehicles.



United Press

Exterior view of new British gas turbine tank undergoing a trial demonstration.

Auto-Lite Will Use Part Of Loan to Modernize

Electric Auto-Lite Co. will use more than $14 million of a new loan from Equitable Life Assurance Society for modernizing its operations and developing products. Remainder of the $35 million loan will be used for refunding outstanding obligations to Equitable.

The loan was obtained at par without discount or commission. It is evidenced by Auto-Lite's note in the face amount of $35 million, bearing interest at the rate of 3¼ per cent per annum, payable semi-annually.

Defense Contracts Awarded To Eight Mich. Companies

Eight Michigan firms will share defense contracts amounting to more than $27 million awarded last month (October) by the Detroit Ordnance District. Biggest assignment, totaling $16.912 million, was given to AC Spark Plug for the production of the Skysweeper anti-aircraft guns. AC also got another award for $1.314 million for spare parts.

Other awards went to: Auto Specialties Mfg. Co., Inc., $2.016 million for 280 mm shells; GMC, $370,000 for partial layaway of the 2½-ton truck facility; Motor Wheel Corp., $2.493 million for production of cartridge cases; Pontiac, $178,902 for M-39 aircraft 20 mm machine guns; Reo Motors, $1.033 million for 2½-ton trucks; Oldsmobile, $250,000 for 90 mm gun facilities; and Checker Cab Co., $2.5 million for one-ton trailers.

President's Highway Project Gets Full Backing of AMA

The Automobile Manufacturers Association is giving full support to President Eisenhower's proposed $50 billion highway construction program. AMA's own studies indicate that at least $3 billion is wasted annually because of inadequate and unsafe roads and streets. The losses result from excessive fuel consumption, tire and brake wear, needless traffic accidents, and time losses for commercial vehicles.

AMA has strongly urged that substantial funds be earmarked for continuing research, particularly toward materials and engineering specifications, and the effect of highway designs and traffic engineering features on driver behavior.

Ford Sets Factory Price Of $2695 on Thunderbird

Ford Motor Co. has announced a suggested factory list price of $2695 for its new Thunderbird car. It has an all-steel body, a 292-cu in. Y-block, V-8 engine with a 3.75 in. bore and 3.30 in. stroke. The car stands four ft, four and 2/10 in. high in the hardtop model.

The price includes: hardtop; four-way power seats; roll-up windows; built-in dual exhaust; four-barrel carburetor; tachometer; and electric clock. Accessories and options available for the Thunderbird include: soft top; Fordomatic or overdrive transmissions; power steering, power brakes; and power window lifts.

News of the AUTOMOTIVE

At left is George W. Mason, deceased president and chairman of the board of American Motors Corp. At the right is George Romney, his successor.

AMC Under Geo. Romney To Carry on Mason Plan

Appointment of George Romney as head of American Motors Corp. to succeed George W. Mason, who died Oct. 8, did not come as a surprise to the automobile industry. Mr. Romney, as executive vice-president, was second in command of the company and had been groomed for higher responsibilities ever since American Motors became a corporate firm earlier this year.

Mr. Romney, who is 47, has held many responsible posts during his years in the automobile industry. From 1941 to 1948 he served as managing director of the Automobile Manufacturers Association, and, during World War II, helped spearhead the cooperative production activities of the total automobile industry.

After joining Nash-Kelvinator in 1948, Mr. Romney became a vice-president two years later and executive vice-president of the company last year. He retained the title of executive vice-president of the new company formed through the merger of Nash and Hudson.

Mason Left Blueprint for Future

Although American Motors Corp. is expected to continue under its new leader the broad program which he charted, Mr. Mason's untimely death interrupted for him personally a cherished dream of making American Motors a substantial competitor of the Big Three. It was he who was credited with laying most of the groundwork which resulted in the formation of AMC as the fourth largest automobile company in the industry.

Mr. Mason, who was also president of the Automobile Manufacturers Association, graduated from the University of Michigan in 1913 and that same year became associated with Studebaker Corp. in Detroit. After working for several other car firms, Mr. Mason became president of the Kelvinator Corp. in 1928 at the age of 38.

When Kelvinator merged with Nash in 1937 to become Nash-Kelvinator Corp., Mr. Mason was named president, and Charles W. Nash became chairman. After Mr. Nash died in 1948, Mr. Mason became president and chairman.

Merger Rumor Out; Looking Ahead

The new president, chairman and general manager of AMC has spiked recurrent rumors of an imminent merger between Studebaker-Packard Corp. and American Motors Corp. He pointed out that AMC has already launched programs that "insure a bright and prosperous future for the company and its dealers," adding that a further merger with any automobile company is not presently contemplated.

While no major changes are expected at AMC under Mr. Romney's command in the near future, first major move announced by the new president is reorganization of the executive staff. The company will now have a seven-man top policy committee, which will be made up of: John L. Brown, Jr., administration; B. A. Chapman, manufacturing; William H. McGaughey, special assistant to Romney; Edward L. Cushman, industrial relations. Other members are expected to be announced soon.

Although full benefits of the merger of Nash and Hudson will not be realized for some time, AMC is moving toward that direction rapidly. So far the company has disposed of more than a dozen parts warehouses.

Consolidation of the parts and service departments of the two companies is expected to save the new company about $2 million a year. Large costs saving will also result from the use of one basic body shell for both Nash and Hudson cars and the use of other common components.

The 1955 Rambler cars are scheduled for introduction some time in December. Earlier, the company announced that both the Nash Rambler and the foreign-made Metropolitan would be sold by Nash and Hudson dealers. Nash and Hudson models are not expected until early 1955.

MARGIN OF ONLY 2000 UNITS BETWEEN FORD, CHEVROLET

1954 New Passenger Car Registrations*

Arranged by Makes in Decending Order According to the 1954 Eight Months' Totals

MAKE	August 1954	July 1954	August 1953	EIGHT MONTHS Units 1954	Units 1953	Per Cent of Total 1954	Per Cent of Total 1953
Chevrolet	110,613	119,544	117,175	928,009	915,297	24.88	23.37
Ford	109,406	109,893	106,859	925,876	681,537	24.81	17.40
Buick	45,549	47,051	39,070	352,189	319,008	9.43	8.15
Plymouth	27,172	37,791	49,218	281,391	406,451	7.54	10.38
Oldemobile	37,665	40,426	28,475	273,216	229,729	7.32	5.87
Pontiac	27,296	27,221	35,039	235,905	277,772	6.32	7.09
Mercury	21,062	24,910	26,515	198,428	168,253	5.32	4.30
Dodge	11,262	12,447	21,988	102,089	209,227	2.74	5.34
Cadillac	9,755	10,233	8,429	73,715	74,642	1.98	1.91
Chrysler	6,435	7,738	12,629	69,666	108,505	1.87	2.77
Studebaker	7,901	8,463	14,817	64,332	112,316	1.72	2.87
Nash	6,817	7,599	10,092	58,158	108,810	1.56	2.78
De Soto	5,448	5,956	10,162	52,044	83,942	1.39	2.14
Packard	2,980	2,691	5,110	28,348	56,119	.76	1.43
Lincoln	2,747	3,031	3,986	25,583	29,984	.69	.77
Hudson	2,998	4,276	5,017	24,360	49,809	.65	1.27
Willys	1,757	1,679	2,980	13,136	33,455	.35	.85
Kaiser	877	759	1,630	6,430	19,135	.17	.49
Henry J	147	71	955	939	9,197	.03	.23
Misc. Domestic	189	241	102	1,604	1,914	.04	.05
Foreign	2,234	2,294	2,202	16,008	21,134	.43	.54
Total—All Makes	440,312	474,316	502,430	3,731,428	3,916,238	100.00	100.00

* Based on data from R. L. Polk & Co.

AND AVIATION INDUSTRIES

CHAMBERSBURG AIDE

Gen. R. W. Daniels (USA, ret.), recently appointed adviser on special plans at Chambersburg Engineering Co., has had a long and distinguished military career in the ordnance field. At one time, he commanded the Letterkenny Ordnance Depot in Chambersburg, Pa.

GM To Celebrate Milestone With Open House on Nov. 23

General Motors Corp. is shaping up final plans for its biggest celebration in history. On Nov. 23, the company will throw open the doors to the public at its 121 plants in 57 cities in a National Open House commemorating production of the 50 millionth GM car. It also will send a message from GM President Harlow H. Curtice to civic luncheons in 65 cities over the largest closed circuit television hookup ever used.

A 1955 Chevrolet, to be built in the Flint, Mich., plant, will be officially designated as the actual 50 millionth car, and that city will be the focal point of the milestone celebration. Called the "Golden CARnival," the festivity will be kicked off on Nov. 22 with a news conference in Detroit, presided over by Mr. Curtice.

Activities will begin the next day at Flint with a talk by Mr. Curtice to GM employees, preceding a 45-minute parade in that city. It will include college bands, marching units, floats and special cars prepared by GM divisions. Mr. Curtice's talk will be filmed and seen almost simultaneously by other GM employees throughout the country on the same day.

AI TABLOID

An organization known as the American Nuclear Society has been formed for the purpose of fostering the development of nuclear technology . . . Battelle Institute is undertaking a $1.535 million expansion of its nuclear-energy research facilities.

* * *

Stockholders of Clearing Machine Co. have approved the purchase by Pressed Steel Car Co. of the former's assets.

* * *

Firth-Loach Metals, Inc., a newly-formed company in the carbides field, has started operations at its new McKeesport, Pa., plant . . . Armoloy Co. is name of new firm formed to offer to industry a new process for armoring moving metal surfaces.

* * *

An Electronic Computer Clinic will be held in conjunction with the First International Automation Exposition in New York City from Nov. 29 to Dec. 2.

* * *

American Hard Rubber Co. is now making available high-pressure compression and transfer-molded parts of glass-reinforced plastics.

* * *

Willys Motors, Inc., is said to be planning a $500,000 new electronics research and development laboratory . . . Mobay Chemical Co. will build a plant near New Martinsville, W. Va., for the manufacture of isocyanate chemicals.

* * *

Battelle Institute has developed a new titanium alloy that is said to be capable of being heat-treated to high strengths.

* * *

Capac Industries has been formed in Capac, Mich., to engage in several lines of manufacturing activity in the plastics field.

C. K. McCullough Co. is name of new concern formed to specialize in production of indutrial and automatic governors and automatic controls. Offices are at 1307 East Cross St., Anderson, Ind.

* * *

F. L. Jacobs, automobile parts maker, is said to be negotiating for a property outside the automotive field.

* * *

Torrington Manufacturing Co. has changed the name of its Spring Machinery Div. to Wire Forming Machinery Div. . . . Dunlop Tire and Rubber Goods Co., Ltd., is now known as Dunlop Canada, Ltd.

* * *

H. A. King Co. has developed a new process for plating molds to be used in the manufacture of molded rubber parts. . . . Heintz Manufacturing Co. is using a cold extrusion process in the formation of steel for the Navy's "Mighty Mouse" rocket head.

* * *

International Harvester Co. has made price cuts ranging from $43 to $271 on all but one of its smaller farm tractors.

* * *

New film on the die casting process is available from American Zinc Institute, Inc., 60 E. 42nd St., New York 17, N. Y.

* * *

Pacific Wood Products Co. has purchased a substantial portion of the assets of Wright-Hibbard, Inc., industrial truck maker. . . . Bart Manufacturing Corp. has acquired the production facilities of Detroit Die Casting and Plating Co.

* * *

Food Machinery & Chemical Corp. has ben awarded an Army contract for an additional $26.5 million worth of M-59 armored infantry vehicles.

(Turn to next page, please)

News of the AUTOMOTIVE

TABLOID

(*Continued from page 37*)

Allegheny Ludlum Steel Corp. has completed a nine-year rebuilding and expansion program with the launching of a new tandem cold rolling mill at its Brackenridge, Pa., plant.

* * *

Fruehauf Trailer Co. has put on the market its new Model FW-1 warehousemen's van.

* * *

Alpha Corp. has moved to larger quarters at 65 Harvard Ave., Stamford, Conn. . . . Sandusky Abrasive Wheel Co. has transferred operations to Sycamore, Ill.

* * *

Industrial Designers' Institute has named William Mitchell, director of the GM styling section, as chairman of its new Detroit chapter . . . Automobile Old Timers has elected Col. W. F. Rockwell, chairman of the board of Rockwell Manufacturing Co. and Rockwell Spring & Axle Co., as president.

* * *

Du Pont's traveling exhibit on "Mylar" polyester firm is making a nationwide tour. First stop will be New York City, Nov. 3, 4, and 5.

* * *

Aluminum Co. of America has opened the Pacific Northwest's first major extrusion operation at its Vancouver, Wash., plant . . . International Nickel Co. of Canada has started production of electrolytic cobalt at its Port Colborne, Ont., refinery.

* * *

Westinghouse Electric Corp. has purchased all the capital stock of Schneider Manufacturing Corp. of Muncie, Ind. The latter is a manufacturer of torque converters.

* * *

Tubeless tires have been made standard equipment on five International light-duty truck models.

Henney Sells Reo's Lawn Mower Division

Henney Motor Co., Inc., which recently purchased Reo, has disposed of the truck company's lawn mower business. The sale is seen as the first major step by Henney to continue the truck business.

Henney says the primary reason for the sale of the Lawn Mower Div. to Motor Wheel Corp. was to eliminate the confusion and high costs in a plant whose basic activity is the manufacture of trucks. Henney said it is shooting for the No. 1 spot among the truck independents.

While the sale price of the lawn mower division was not disclosed, it includes all physical assets of that part of Reo's business. Motor Wheel acquires the tools, dies, jigs, fixtures, machinery, trademarks, and allied equipment.

Rockwell's Spring Plant To Shut by End of Year

The Falls Spring Div. of Rockwell Spring and Axle Co., Van Dyke, Mich., which has been turning out products for the automobile industry since 1935, will close by the end of the year. All of the operations at the 220,000 sq ft plant will be transferred to the company's plant in Chicago.

A lack of demand for springs was blamed by the company for the shutdown, which will idle 350 employees. The company has lately been manufacturing springs for Hudson, Ford, and Chrysler cars.

Stubnitz-Greene Seeking To Buy Reynolds Spring

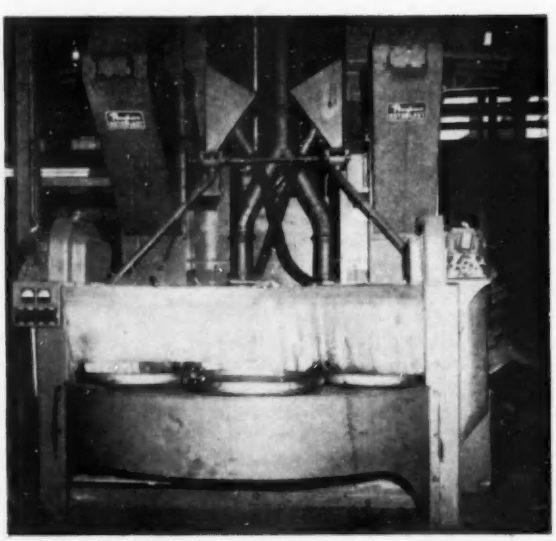
Stubnitz-Greene Corp. expects to double its sales volume when it acquires Reynolds Spring Co., Jackson, Mich. Stubnitz-Greene has offered $1.350 million for Reynolds' fixed assets and inventories and will take over its four plants within 60 days, if stockholders approve the purchase. Reynolds produces cushion springs for cars and plastics, while Stubnitz makes seat spring assemblies.

Sixth Building Completed At Ford Engineering Hub

Completion of a new industrial relations building marks the sixth major unit which Ford Motor Co. has constructed under its multi-million dollar program for the Research and Engineering Center in Dearborn launched in 1947. Containing 45,000 sq ft of floor space, the new building will house all of the various employee services for the company's engineering staff which has grown appreciably.

SHELL MOLDED CASTINGS RUN

Depicted here is a table-blast with Pangborn equipment for cleaning shell-molded castings at Lynchburg Foundry Co. Fourteen shell molding stations and complete core facilities with capacity for producing more than 100 tons of castings per day are also included in the company's new $1.25 million shell molding facilities for turning out gray and nodular iron castings.



AND AVIATION INDUSTRIES

Kaiser Set-Up in Argentina Prelude to Other S.A. Plants

Signing of a contract by Henry J. Kaiser to manufacture cars, trucks and jeeps in Argentina is seen as the first phase of the company's recently announced long-range plans for automobile production in South America. Kaiser is also known to have big plans for production of cars and trucks in other countries, such as Peru, Colombia and Brazil.

Chevrolet Cites Reasons For Optimism in Future

As 1954 nears its end, the automobile industry is once again preparing for the year ahead with great confidence. Looking to the immediate future and the long-term growth for the industry's products, T. H. Keating, general manager of Chevrolet, bases the company's optimism in the future and increased productivity on three factors.

Mr. Keating notes that the fear of depression is substantially abated, that the country's population is growing by 11,000 a day, and that there is new stimulus in building roads and parking facilities.

Despite talk by gloomy prophets about the country's economy and forecasts of saturation in the industry, Mr. Keating pointed up that there are 20 million more people working today than there were 15 years ago. Considering the high scrappage rate as a barometer of the automobile market's economic health, millions of new cars will be needed for transporting the growing population, the Chevrolet executive asserts.

Confident in the outlook, Chevrolet, like other GM divisions, has been undergoing one of the biggest modernization programs in its history. Chevrolet will have nearly 5½ million sq ft more of manufacturing and assembly space when it completes its program this year.

Some of the bigger projects Chevrolet completed this year include addition of 424,000 sq ft of space at the Tonawanda, N. Y., engine plant; 278,000 sq ft for a new forge plant in that area; and 485,000 sq ft for a new foundry that is is highly modern.

In addition, Chevrolet has added nearly two million sq ft to its Flint, Mich., operations, including more than one million sq ft for a new engine plant and an 820,000 sq ft plant for building automobile frames, the first such venture by Chevrolet. Both of these plants are operating now, although the frame plant still has some work to be done on it.

In Livonia, Mich., Chevrolet has added 814,000 sq ft for its spring and bumper plant and installed new automatic lines called "segmented automation." Biggest feature of this type of automation is that it enables the plant to keep major segments of a line running in case of a breakdown anywhere along the line.

Another 832,000 sq ft has been added at plants in Indianapolis and Muncie, Ind., Cleveland, O., and other assembly plants. Major parts supply depots also will be set up in Atlanta, Ga., and St. Louis, Mo.

TRUCK SALES STILL OFF OVER 10% FROM 1953 PERIOD

1954 New Truck Registrations*

Arranged by Makes in Descending Order According to the 1954 Eight Months' Totals

MAKE	August 1954	July 1954	August 1953	EIGHT MONTHS Units 1954	Units 1953	Per Cent of Total 1954	Per Cent of Total 1953
Chevrolet	22,959	24,171	26,154	199,296	227,526	35.43	36.22
Ford	21,115	19,478	24,411	185,313	160,002	32.93	25.47
International	6,532	6,685	7,188	55,166	68,041	9.80	10.83
G.M.C.	5,113	5,276	6,748	46,182	59,121	8.21	9.41
Dodge	4,499	4,764	6,288	40,346	59,419	7.17	9.46
Studebaker	794	869	1,707	7,328	17,136	1.30	2.73
White	723	799	918	7,054	8,569	1.25	1.36
Willys Jeep	541	669	787	4,845	6,231	.86	.99
Willys Truck	662	753	814	4,790	6,124	.85	.97
Mack	447	573	613	4,062	4,678	.72	.74
Diamond T	196	210	316	1,811	2,320	.32	.37
Reo	151	156	259	1,542	2,468	.27	.39
Brockway	117	108	167	834	1,397	.15	.22
Autocar	71	85	138	780	1,182	.14	.19
Misc. Domestic	225	342	443	3,129	3,891	.56	.62
Foreign	35	45	23	207	183	.04	.03
Total—All Makes	64,180	65,181	76,673	562,685	629,287	100.00	100.00

* Based on data from R. L. Polk & Co.

1954 RETAIL CAR SALES BY PRICE GROUPS*

Number of Cars

Price Group	August 1954 Units†	August 1954 % of Total	August 1953 Units†	August 1953 % of Total	Eight Months 1954 Units†	Eight Months 1954 % of Total	Eight Months 1953 Units†	Eight Months 1953 % of Total
Under $2,000	259,506	59.04	287,251	57.45	2,217,304	59.69	2,118,507	54 41
$2,001 to $2,500	116,615	26.67	140,467	29.09	950,217	25 56	1,105,694	28 39
$2,501 to $3,500	46,301	10.57	53,733	10.74	398,728	10.73	506,698	13 06
Over $3,500	16,303	3,72	18,606	3,72	148,432	4.00	161,226	4.14
Total	437,925	100.00	500,076	100.00	3,714,681	100.00	3,894,125	100.00

Dollar Volume of Sales*

Price Group	August 1954 Dollars	August 1954 % of Total	August 1953 Dollars	August 1953 % of Total	Eight Months 1954 Dollars	Eight Months 1954 % of Total	Eight Months 1953 Dollars	Eight Months 1953 % of Total
Under $2,000	$471,272,739	50.73	$511,729,532	49.12	$4,036,907,641	50.29	$3,796,614,686	45.87
$2,001 to $2,500	267,982,505	28.84	313,614,191	30.10	2,174,820,731	27.61	2,467,619,325	29.89
$2,501 to $3,500	126,284,907	13.59	147,486,133	14.16	1,088,889,736	13.82	1,395,782,207	16.91
Over $3,500	63,545,406	6.84	68,994,561	6.62	573,654,305	7.28	605,140,879	7.33
Total	$929,085,557	100.00	$1,041,824,397	100.00	$7,876,272,413	100.00	$8,255,157,097	100.00

*—Calculated on basis of new car registrations, as reported by R. L. Polk & Co., in conjunction with advertised delivered price at factory of four door sedan or equivalent model. Does not include transportation charges or extra equipment.
†—New registrations of American made cars only. Does not include imported foreign cars.

Men in the News

American Machine & Foundry Co.—Gen. Walter Bedell Smith was elected vice-chairman of the board of directors.

Rinshed-Mason Co.—**Lyle E. Frohberg** has been appointed vice-president in charge of sales.

AC Spark Plug Div., General Motors Corp.—**Karl Schwartzwalder** has been named director of research, and **Dr. Wilfred A. Bychinsky** has been promoted to assistant chief engineer in charge of spark plug work.

Parker Rust Proof Co. — **Dr. R. C. Gibson** is now assistant vice-president; **E. W. Richards,** technical director; **R. I. Peterson,** service manager; and **C. F. Rasmussen,** assistant service manager.

Willys Motors, Inc.—**S. G. Hawley** was appointed works manager; **D. G. Costello,** production manager; and **F. A. W. Anger,** chief inspector.

Clark Equipment Co., Construction Machinery Div. — **Lowell Conrad** is now director of engineering, and **Raymond H. Bowman** has become chief engineer of the Engineering Section.

Chrysler Corp., Marine & Industrial Div. — **William A. Martin** has been made works manager.

Tranter Mfg., Inc.—**S. J. Stowell** has become sales manager.

Ford Div., Ford Motor Co.—**Harry B. King** was appointed manager of the Atlanta sales district.

Westinghouse Electric Corp.—**Dr. W. H. Brandt** has been named to head a new Products Engineering Dept.

Chrysler Corp.—**H. H. Harbison** was made supervisor of college recruiting.

General Motors Acceptance Corp. — John O. Zimmerman has been elected vice-president and director.

Lamb Electric Co.—Richard J. Lamb was elected chairman of the board and Clyde F. Curtis was named president.

Plymouth Motor Corp.—**William L. Martin** is now a member of the executive sales staff.

Firestone Tire & Rubber Co., Corporal Guided Missile Div.—**H. I. Gibson** has been named manager.

Ionia Mfg. Co. — **Leslie C. Shoemaker** was named chief body engineer.

Fenwal, Inc. — **Raymond H. Matthews** has been appointed chief engineer.

Borg-Warner International Corp.—**John W. DeLind, Jr.,** has been elected chairman of the board, and **Rowland Burnstan** succeeds him as president.

Gear Grinding Machine Co.—**Herbert S. Ries** has been elected president of the firm's newly purchased subsidiary, Republic Gear Co. **Edgar D. Leon** was elected president of another subsidiary, Detroit Bevel Gear Co. **Sterling Richhart** has been re-elected as secretary-treasurer and director of both Republic and Detroit Bevel Gear Co.

Vickers, Inc. — **Marguerite Mayne** was named administrative assistant to the treasurer.

Pittsburgh Plate Glass Co., Paint & Brush Div. — **Thomas M. Riley** was chosen advertising manager.

Lipe-Rollway Corp., Clutch Div.—**Thomas H. Kenny** has become field service representative.

Chrysler Div., Chrysler Corp. — **C. G. Beeching** is now a special sales representative.

Tung-Sol Electric Co. — **Donald L. McKenna** has been made sales representative in Southeastern states.

Morse Chain Co.—**Frank M. Hawley** has been elected chairman of the board, and **Stanley J. Roush** has been named president and general manager.

Joseph T. Ryerson & Son, Inc.—Raymond N. Carlen was appointed assistant to the vice-president in charge of operations.

AC Spark Plug Div., General Motors Corp.—**Taine G. McDougal,** director of spark plug engineering and research, has retired.

Chrysler Corp.—**Charles B. Avery** has been appointed West coast promotion manager.

Raytheon Mfg. Co.—**Nathaniel B. Nichols** has been appointed an assistant vice-president, and **Dr. K. C. Black** is now head of the Communications Engineering Dept.

Victor Adding Machine Co., Electri-Car Div.—**William J. Freund** has been appointed sales manager.

Northrop Aircraft, Inc.—**Earle M. Jorgensen** was elected to the board of directors.

Convair Div., General Dynamics Corp.—**J. D. Donaldson** joined the Commercial Sales Dept. at San Diego as sales manager.

Garrett Corp.—**James L. Murray** and **Emery M. Ellingson** were appointed assistants to the president.

Ramo-Woolridge Corp., Guided Missile Research Div.—**Simon Ramo** was named director; **R. P. Johnson,** vice-president for research and development; **Louis G. Dunn,** associate director; **Milton U. Clauser,** director of aeronautics and structures staff; and **James C. Fletcher,** director of guidance and control staff.

Lunn Laminates, Inc.—**Robert A. Huddleston** is now administrative assistant to the president.

Michiana Products Corp. — John B. Dickey has been elected comptroller.

Chrysler Corp., Marine & Industrial Engine Div.—Clyde C. Williams was elected vice-president of sales.

Lamb Electric Co.—**H. Clay McElhone** was elected senior vice-president.

Carborundum Co.—**I. Wendell Hamm** was named director of manufacturing.

Ford Motor Co., Aircraft Engine Div.—**Robert Insley** was made chief product engineer.

Turner Mfg. Co.—**Turner A. Duncan**, vice-president and general manager, has been elected to the board of directors.

Kaiser Aluminum & Chemical Sales, Inc.—**M. C. Crockett** has been appointed automotive industry manager.

Youngstown Metal Products Co.—**Henry A. Holberson** has been elected vice-president and general manager.

Krylon, Inc.—**Donald K. Baxter** was chosen sales manager.

Stanley Aviation Corp.—**Andrew J. Kutler** has been appointed manager of sales and service.

E. Edelmann & Co.—**Don Hanson** was named general sales manager.

General Electric Co., Aircraft Gas Turbine Div.—**Edward Glodeck** is now manager of product planning for the Jet Engine Dept.

Park Chemical Co.—**W. P. Woodside Jr.**, has been elected president.

Lycoming Div., Avco Mfg. Corp.—**H. Webster Crum** was named vice-president and general sales manager.

Minneapolis-Honeywell Regulator Co.—**Stephen A. Keller** has been named general manager of the Heiland Div., and **Marshall B. Taft** succeeds him as manager of the Valve Div.

Martin-Parry Corp.—**W. H. Murphy** has been made vice-president in charge of manufacturing.

National Screw & Mfg. Co.—Price Berrien was appointed general plant manager.

Marlin-Rockwell Corp.—**Bernard J. Shallow** was named general sales manager and **Howard A. Johnston** was made president.

Bell Aircraft Corp.—**Lawrence D. Bell** has resigned as general manager, and **Leston Faneuf**, succeeds him. **William G. Gisel** has become secretary.

Marquardt Aircraft Co.—**Robert G. Francis** has been promoted to manager of production engineering and materiel, and **Kenneth Hisey** has been named general foreman.

Acme Steel Co., Special Products Div.—**Walter S. Snodell** has been appointed sales manager.

Chrysler Corp.—**Leroy B. Bornhauser** was named manager of the Indianapolis plant.

National Vulcanized Fibre Co.—**William H. Harbaugh** and **John T. Bishop** have been appointed manager and assistant manager, respectively, of the Kennett Square, Pa., plant.

Set Screw and Mfg. Co. — Earl J. Clark has been named general sales manager.

Trailmobile, Inc.—**Carl J. Koelsch, Jr.**, was made associate director of purchases.

Temco Aircraft Corp.—**Virgil B. Pettigrew** is now assistant manager of manufacturing control.

E. W. Bliss Co., San Jose Div.—**Randolph E. Bailey** and **Robert P. Marks** are now members of the sales engineering staff.

Douglas Aircraft Co., Inc.—**Don Black** has been elevated to assistant director of public relations; **C. G. Miller**, public relations manager for the El Segundo Div., and **Larry Vitsky**, public relations manager for the Santa Monica Div.

National Tool Co.—**Raymond D. Lindstrom** was elected vice-president for manufacturing, and **Joseph B. Clough** was chosen vice-president for sales.

Dunlop Tire and Rubber Corp.—**Frank S. King** is now technical manager for tires.

AP Parts Corp.—T. O. Ulmer has been named vice-president in charge of sales.

Lindberg Engineering Co., High Frequency Div.—**L. R. Farrell** has joined the organization to specialize in motor generator induction heating sales.

Gavitt Wire & Cable Co.—**Richard P. Houlihan** was appointed general manager.

Temco Aircraft Corp.—**I. Nevin Palley** has joined the firm as vice-president for engineering.

Allied Products Corp.—**Jules F. Halm** has retired as treasurer and assistant secretary. **V. Leonard Hanna** succeeds him as treasurer, while **Peter C. Fortune** has become assistant secretary.

Babcock & Wilcox Co.—**N. J. Connor** has become manager of the New York district office.

Continental Industrial Engineers, Inc.—**H. L. Wentworth** has been named vice-president and chief engineer; **R. E. Angley**, manager of estimating and sales engineering, and **W. G. Wilson**, chief design engineer.

Necrology

George W. Mason, 63, chairman of the board and president of American Motors Corp., died Oct. 8, at Detroit, Mich.

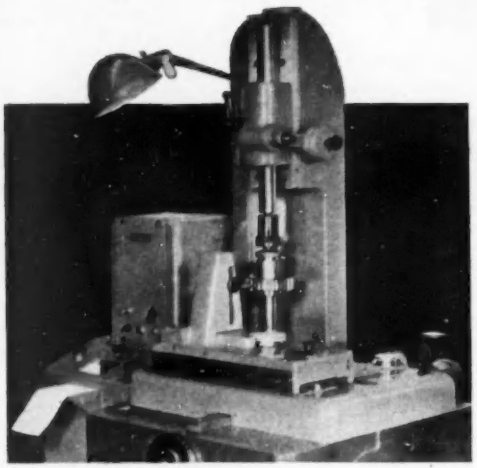
Gilbert H. Turner, 48, director of industrial relations for Timken Roller Bearing Co., died Oct. 9, at Canton, O.

Alfred J. Fairfield, 62, retired sales manager of the Detroit and Pittsburgh branches of Russell, Burdsall, & Ward Bolt & Nut Co., died Oct. 4, at Port Chester, N. Y.

Frank W. Rowe, Sr., 85, former general purchasing agent for Johns-Manville Corp., died Oct. 3, at New Rochelle, N. Y.

Otto G. Lonsky, 59, vice-president and general manager of Automobile Shippers, Inc., died Oct. 11, at Grosse Point Park, Mich.

GEAR COSTS



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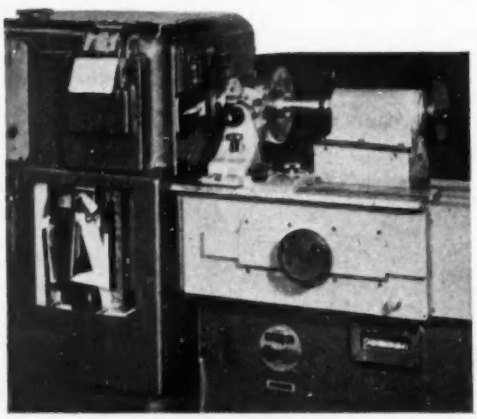

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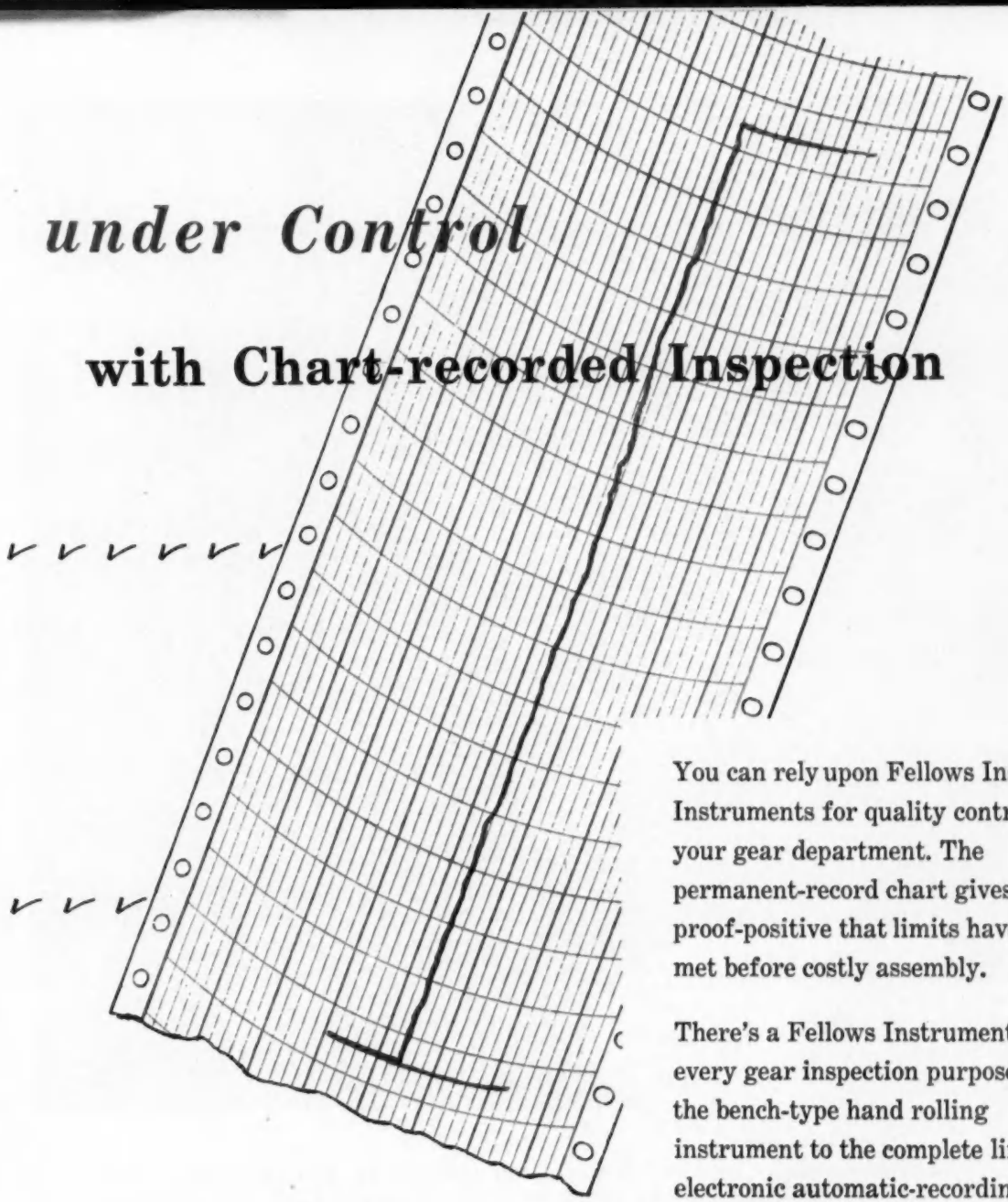

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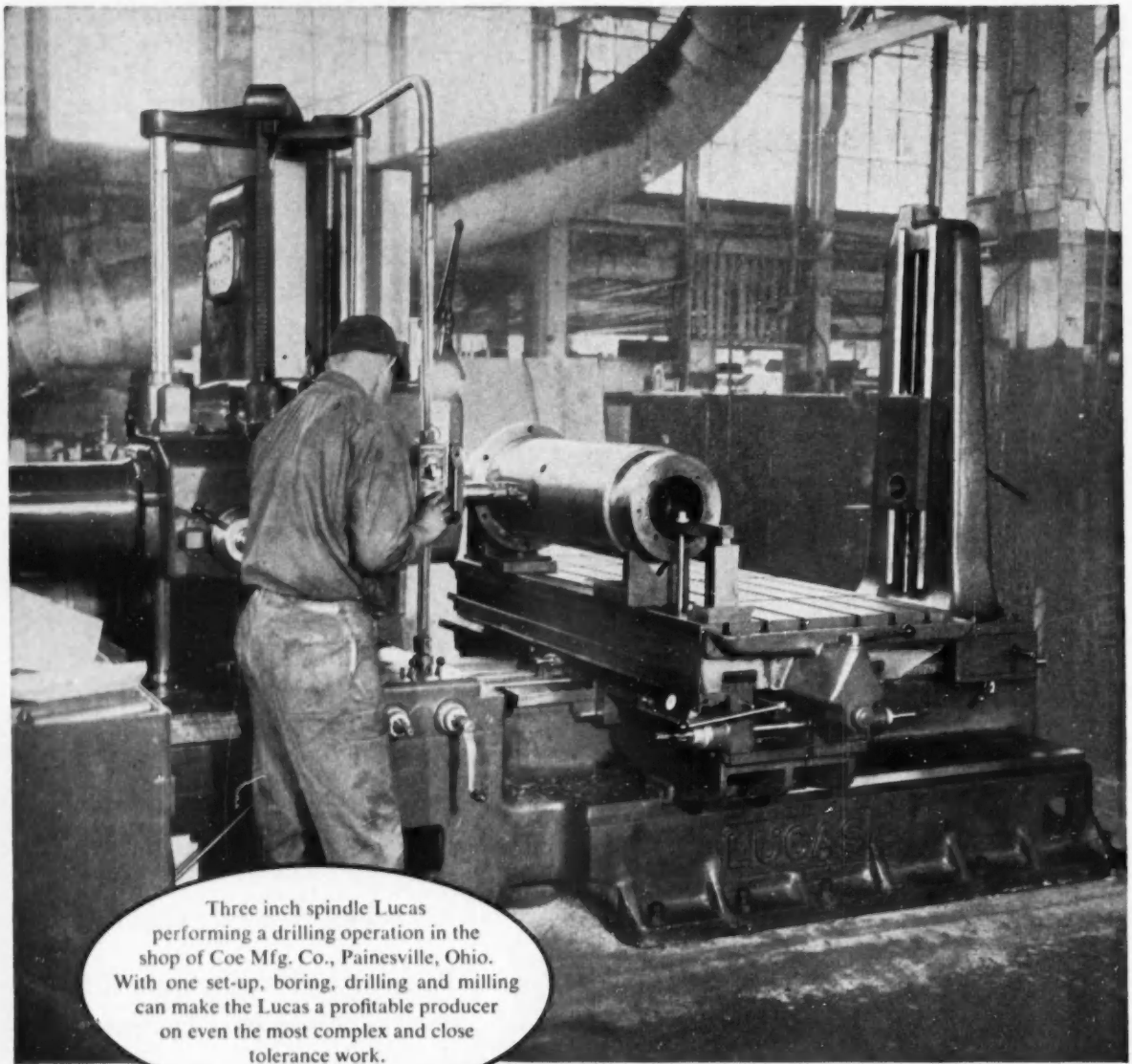

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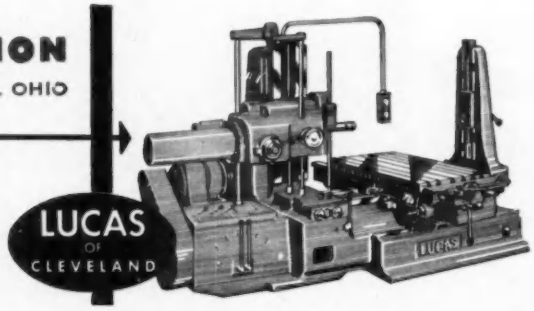

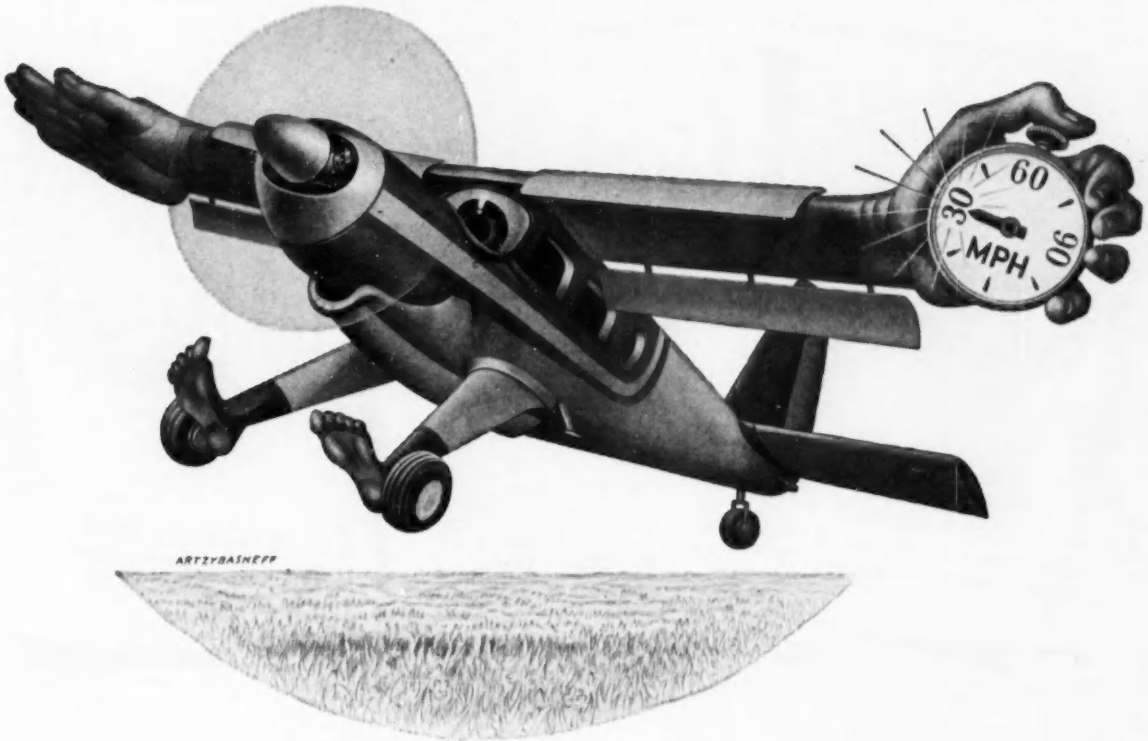

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Visitors to BAKELITE's Exhibit at the recent Metals Show were able to learn of the latest developments in plastics firsthand. Here are a few of the important advances which attracted greatest attention:

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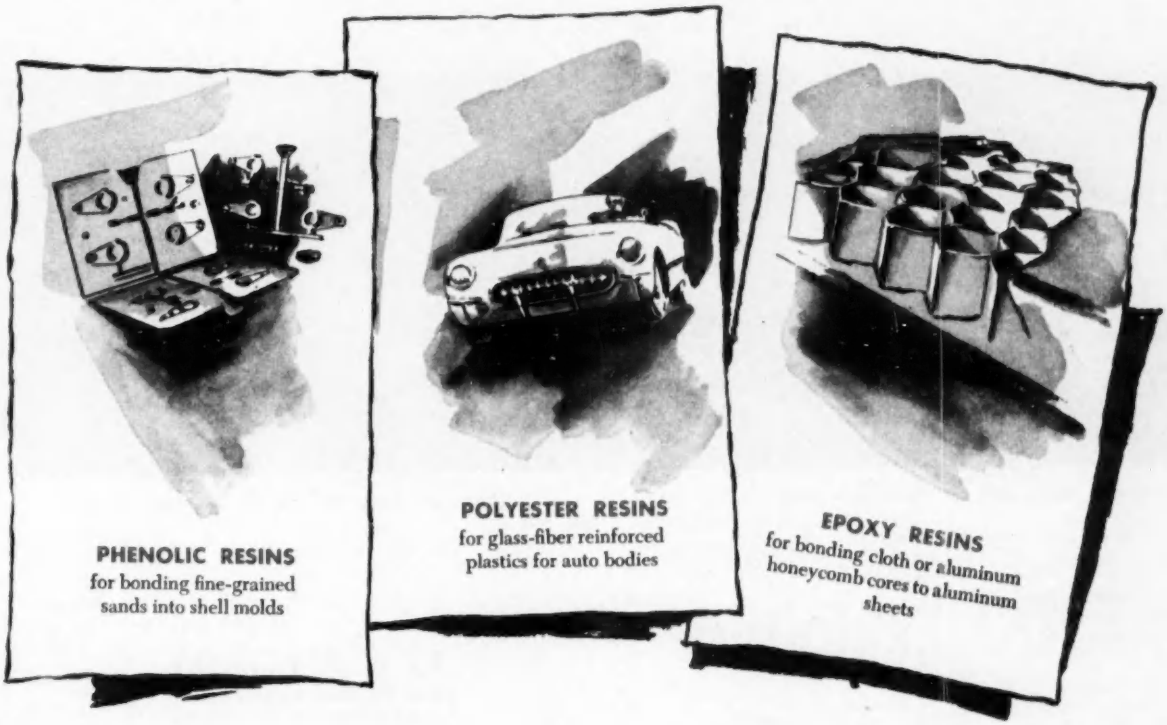

PHENOLIC RESINS
for bonding fine-grained sands into shell molds

POLYESTER RESINS
for glass-fiber reinforced plastics for auto bodies

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for bonding cloth or aluminum honeycomb cores to aluminum sheets

METALS SHOW

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New Austin A40-A50 Cambridge sedan

All-plastic body built by the Chausson Co.

1300 Exhibitors from 14 Nations at Paris Automotive Show

By W. F. Bradley
Special European Correspondent for AUTOMOTIVE INDUSTRIES

PARIS, FRANCE

WHEN Paris threw open the doors of its forty-first automobile show and the President of the Republic inaugurated it with all the necessary pomp, it was to reveal a very strong international element, considerable growth, real price competition, and a very small number of mechanical changes.

In common with all other countries, France is surrounded by tariff barriers and import limitations. This did not prevent 14 nations being represented among the 1300 exhibitors to be found inside the Grand Palais. The reason is that Paris is Europe's great international center, to which more foreign buyers are attracted than to any other city, and both British and Americans find it to their advantage to make a display and to maintain permanent quarters in the city for reasons of prestige and because of the influence these displays will have on other territories.

Sales are brisk and production is increasing in France, Germany and Italy. Last year France barely reached an output of half a million passenger cars and trucks. This year's activity indicates that the output for the full year will exceed 600,000. During the first half of the year passenger car exports increased 32 per cent; truck exports jumped 69 per cent and the increase in exports for all types of vehicles was 37 per cent. Home registrations went up from 197,467 in the first six months of last year to 244,226 for the corresponding period of 1954.

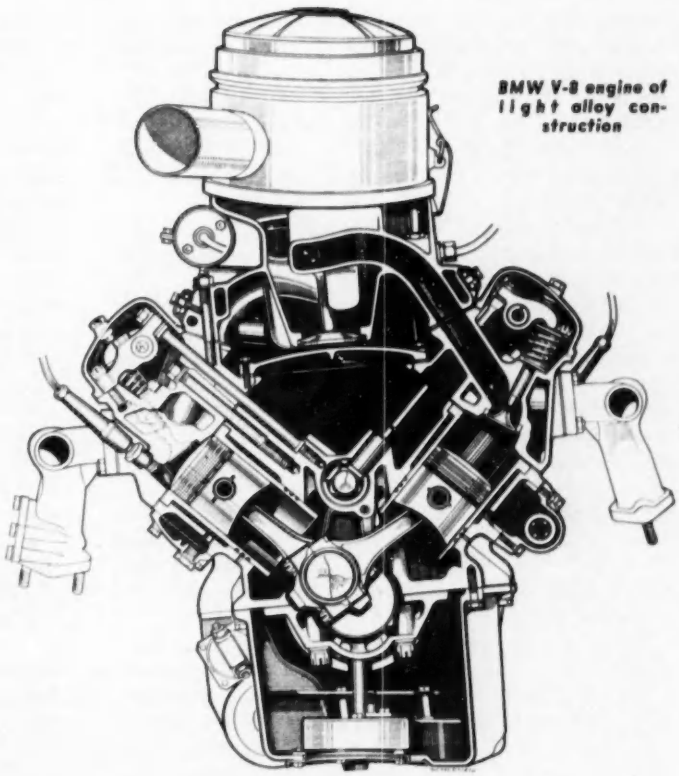
The growth is confined to six firms; Renault, Citroen, Peugeot, Simca, Ford and Panhard. These can really be reduced to five since Simca and Ford have linked up. Six other firms: Hotchkiss, Delage, Salmson, Delahaye, Talbot and Facel, produce in very small quantities.

The expected price war came on the opening day of the show, when Ford announced that the new eight-cylinder Trianon model would be sold on the French market at $2214. This move was particularly directed against Renault, which has a smaller engined car (122 cu in.) but of the same seating capacity as the Ford. Within a few hours this State-controlled organization announced that its new price would be $2080. Then Simca came along with a cut which brought the Aronde price to $1625. While this car is smaller than the Ford, it is sufficiently near the Renault to be a real competitor. This price warfare may be felt throughout Europe and the struggle will be particularly keen between Ford, with factories in England, France and Germany and General Motors with Vauxhall in England and Opel in Germany.

With the exception of Studebaker, American makers showed 1954 models. There were several examples of Italian bodies on American chassis: Hudson had a

The Simca features excellent visibility

New Bristol 405 sedan



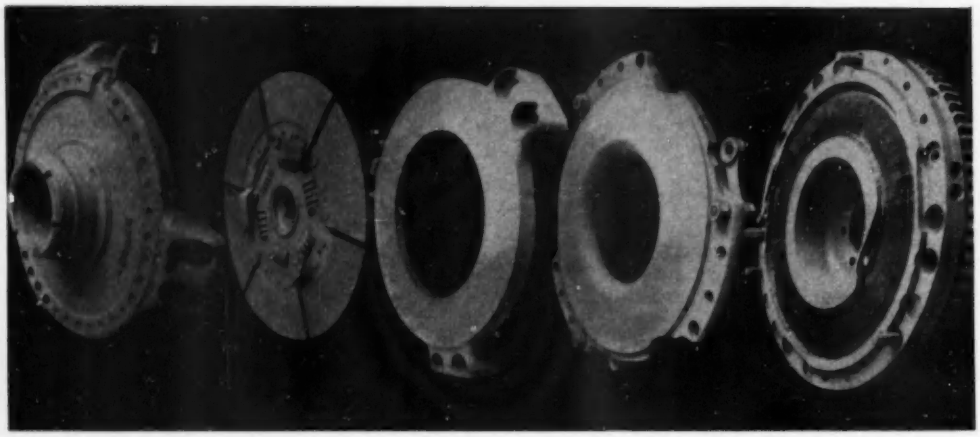
BMW V-8 engine of light alloy construction

Superleggera two-door sedan; Chrysler had two special bodies by Ghia.

Ford stood out as the only firm producing entirely new models, the Trianon, Versailles and Regence, with the Marly station wagon to follow later on, mechanical features being the same for all types and most of the body components being identical. The chief difference is in the greater elaboration of trim and equipment.

Other European makers limited themselves to modifications of a more or less important nature. Renault adopted pressurized cooling for both its passenger cars and improved the heating and seating arrangements on the small rear engine model. An automatic clutch produced by the Ferodo Co. was offered at an extra cost of about $65 for the small car and $75 on the Fregate. The rights for industrial vehicles are held by Chenard & Walcker, a branch of the Chausson organization. There are two models, an electro-magnetic known as the Ferlec and the Gravina, an electrically operated centrifugal type. The Ferlec is a friction-type clutch operated magnetically. A disk mounted on the end of the crankshaft, and carrying the usual starter gear ring, has recesses in which windings are mounted to create a magnetic flux. Opposite the disk is an armature of special magnetic steel, capable of slight longitudinal movement. A cast iron friction plate is mounted on the armature by three lugs, and has a collector ring riveted to it. When the current supplied by the generator is supplied to the collector ring, the friction plates are brought into contact and the drive is taken up. The main switch is in the speed change lever, so that the connection is broken and declutching takes place before the lever is moved to pick up another gear ratio. As the speed change lever is released, contact is made and the current increases as the generator picks up speed. Provision is made for drawing current from the battery in case of a generator failure.

The Gravina centrifugal clutch has been in existence about twenty years, but has recently been taken over by Ferodo. In this clutch, connection between driving and driven members is obtained by bob weights acted on by centrifugal force. The bob weights ride on the face of a cam, the effort being communicated to a counterplate and then to the clutch pressure plate by means of the clutch springs. Con-



Principal components of the Ferlec electromagnetic clutch

nection is broken by the return of the bob weights as engine speed decreases. Electric current is made use of through a switch in the speed change lever to withdraw the whole of the centrifugal weight mechanism, thus declutching while the required gear is being engaged. Provision is also made for limiting the torque to the road wheels when a rapid change is made to a lower gear ratio.

Citroen's changes were confined to the four-passenger aircooled twin engine, the piston displacement of which was increased from 22.8 to 25.9 cu in. This is said to step up the effective horsepower from 9 to 12. The car also has a simple type of centrifugal clutch, with bob weights inside a drum, the flange of the drum forming the friction surface for a single plate clutch. This 12 hp Citroen, the lowest priced four-passenger car on the European market, is in such demand that there is a two-year delay in delivery. Production is being pushed up to 450 per day, but has been held back by reason of insufficient machine tools. The other two Citroen models, a front wheel drive four and a six, have undergone no important change, but there is reason to believe that new types are being prepared.

Producing one chassis with a four cylinder, valve-in-head 74.4 cu in. engine, with three body styles and a series of light delivery vehicles, Simca continues with some mechanical changes, among these being the adoption of 14 in. wheels. A new clutch, built under American license, is now used. The four speed transmission is fully synchronized and is entirely new.

Peugeot, also producing one type chassis, with three body styles, has limited changes to a completely synchronized gearbox and provision for folding the seats down so as to form two full length sleeping berths.

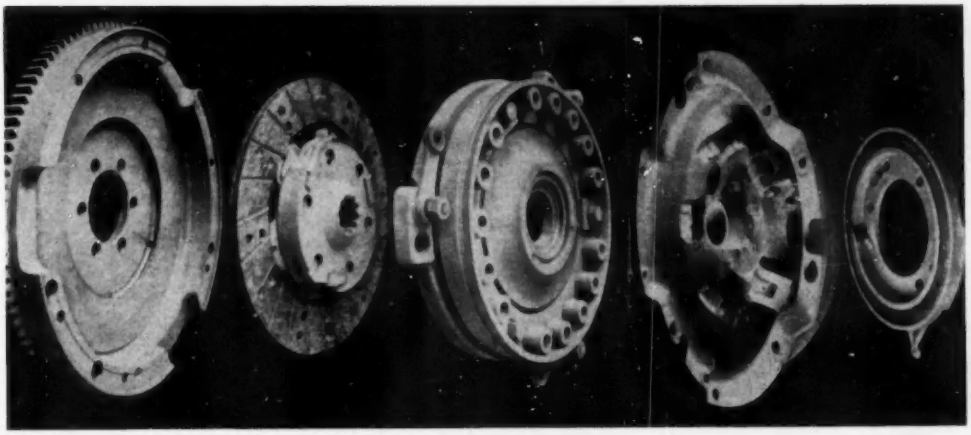
French Talbot has produced a four cylinder sports model of 152.5 cu in., with pushrod operated overhead valves, two dual Weber carbureters and a ZF synchromesh four speed transmission. This power plant will be fitted in a tubular chassis frame which will carry a light two-passenger body and will scale under 2000 lb. It will not be in production before May.

Because of the commercial importance of the Paris display, most of the English makers uncovered their 1955 models there before they had been shown in their homeland. Austin came out with the Cambridge series, which is a revamping of the A-40, and comprises five different types, four of them having a four cylinder engine of 73 cu in. displacement, still known as the A-40, and two others with a 91½ cu in. engine and designated the A-50. The smaller engine has a bhp of 42 at 4500 rpm, with maximum torque of 58 lb-ft, and the larger power plant develops 50 hp at 4400 rpm with a maximum torque of 74 lb-ft at 2100 rpm. Both have a 7.2 to 1 compression ratio. A similar transformation on one of the bigger Austin models is being held back for the London show.

The Austin engines are similar to those of the Morris Oxford and the M.G. Magnette, with Zenith inverted carburetor 30 VIG 10. Wheelbase has been extended 6¾ in. compared with the Somerset. Gear shift is under the steering wheel. Brake area has been increased from 83 sq in. to 121 sq. in. Styling has been changed, particularly the front end treatment.

Rover presented cars embodying the same general policy, namely practically one car with three different engines; the 60, the 90 and the 75. Changed body styling gives an increased area rear window and more space in the luggage compartment. A free wheel device is retained and is the only one in production in Europe. Rover has just planned a 50 per cent increase in automobile production, the plant area having been enlarged to 2,000,000 sq ft. Expansion will step up Land Rover production to 200 units per day.

Most important of the Jaguar developments was the Type D sports model, seen for the first time in the 24 hour race at Le Mans, which is now going into regular production to supersede the Type C. The Type D develops 246 hp at 5800 rpm and incorporates dry sump lubrication with a built-in oil cooler. An outstanding feature is a three-plane tubular truss structure chassis frame built into a stressed skin unit-construction body. Disk brakes are standard equipment. The 1955 range consists of a new Mark VII, 3½ litre Type M sedan; the XK140 open two-passenger car; the XK140 drophead coupe; the XK140 2-3 passenger hardtop coupe; and the D type competition model.



Gravina centrifugal clutch

Armstrong Siddeley's modification was the adoption of an automatic transmission on the Sapphire. Rolls Royce and Bentley are the only other European cars with American automatic transmissions.

In the matter of styling Bristol featured the absence of a radiator grille, having instead a jet-type opening for the air with a headlamp set in its center and a wire screen behind it to prevent objects passing through. The chassis remains the same, with a six-cylinder 120.3 cu in. engine developing 105 hp at 5000 rpm. For the first time there was a four-door sedan in the Bristol line.

At earlier shows BMW displayed a chassis frame featuring very large diameter tubes the full width of the vehicle. This model, the 501, had a six cylinder engine and is now supplemented by the 502, a light alloy V-8 of 2.94 by 2.98 in. bore and stroke, having a compression ratio of 7 to 1 and developing 105 hp. Valves are in the head, operated through pushrods and rockers. The chassis has a separate ZF four-speed synchromesh transmission. A feature of the suspension is the use of exceptionally long torsion bars, parallel to the frame members, for the banjo type rear axle and for the independently sprung front wheels. Wheelbase is 111 in. and weight of the sedan 3100 lb.

Among body details was noted the use of circular section shackle-type bumpers, those at the front being placed just below the headlights, and in the case of the Pinin Farina one leg of the shackle being extended to wrap around the lower edge of the fender. Saoutchick, with a Pegaso chassis, used the same type of shackle bumper, but mounted vertically, both front and rear. Naturally they offered no protection tor the center of the car. On a Pinin Farina body the side panels were extended to form two fins, the rear window being recessed between them.

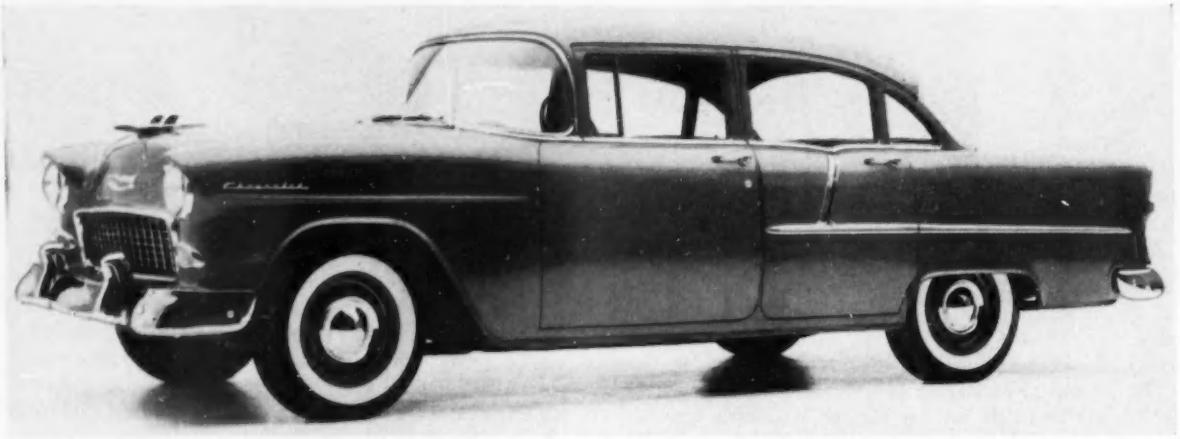
Plastic bodies have not yet reached the full commercial stage. The only important example was that of the Chausson Co., probably the largest producer of pressed steel bodies in Europe. This company showed one all-plastic body, produced for D.B., a firm marketing sports cars with the use of Panhard mechanical units. This two-passenger closed car had 13 plastic body elements and was said to weigh only 1276 lb, this achieving a saving of 80 lb over a similar automobile in aluminum. The low total weight is due, in a certain measure, to an aircooled power plant embodying much aluminum alloy. The whole car was painted, and the plastic bumpers were chromium plated. While Chausson is still in the experimental stage of plastic construction, big commercial developments are planned.

If no big automobile manufacturer is showing interest in plastic body construction, several small firms are active. The engineer Grandvalet, working in conjunction with the

(Turn to page 102)

Berliet 8 x 8 tractor powered by a 12-cyl Diesel of 450 hp

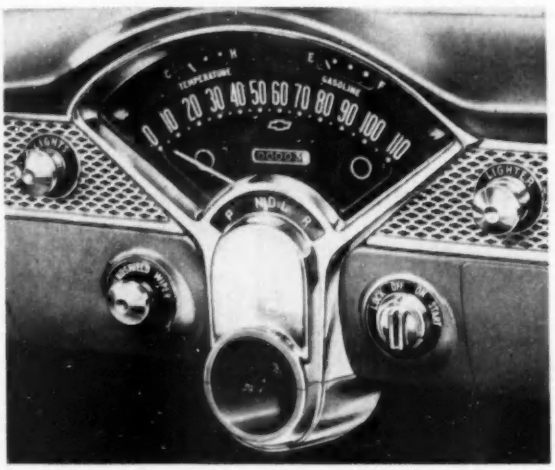
CHEVROLET *Completely New* FOR '55



The four-door Two Ten, one of 14 models offered by Chevrolet for 1955.

Major Features Are V-8 Engine, New Chassis and Body. Among the Changes Are Ball Joint Front Suspension, with Hotchkiss Drive, Overdrive, Improved Frame, and Higher Hp Six-Cylinder Engines

By Joseph Geschelin



The quadrant for Powerglide is placed on the instrument panel. This location lends itself to illumination at night.

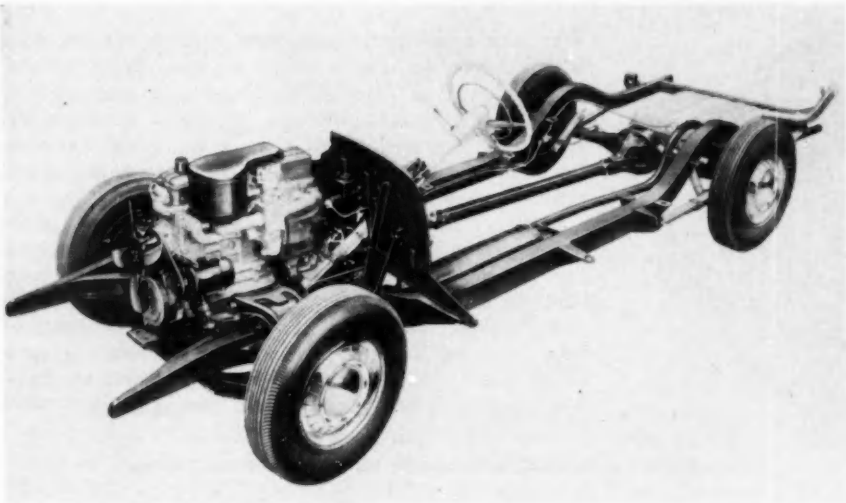
COMPLETELY restyled, with eye-appeal reflecting the "dream car" influence envisioned in General Motors circles in recent years, Chevrolet offers in 1955 a radically new array of mechanical features and design concept that sets its offerings apart from the usual yearly change.

Easily most distinctive is the introduction of a 162-bhp, high compression, high efficiency, valve-in-head, 90-deg V-8 engine, the first to be offered by Chevrolet in 35 years. With a stroke of only 3-in., it is said to be one of the shortest stroke engines in the field, with remarkably low friction loss. One of its novelties is the complete elimination of the conventional rocker arm shaft and its usual supports, thus making for more production and maintenance simplicity.

In addition, Chevrolet continues its familiar valve-in-head, six-cylinder engines, giving owners an option of powerplants. Although these engines remain unchanged basically, except for details to be described later, they have been given higher ratings—123-bhp with manual-shift transmission; 136-bhp with Powerglide drive.

Another noteworthy item is the adoption of 12-volt electrical systems on all models, thus increasing the ability of the system to handle added electrical loads as well as the ignition demands of high performance, high compression engines.

A high-performance power package, which can be

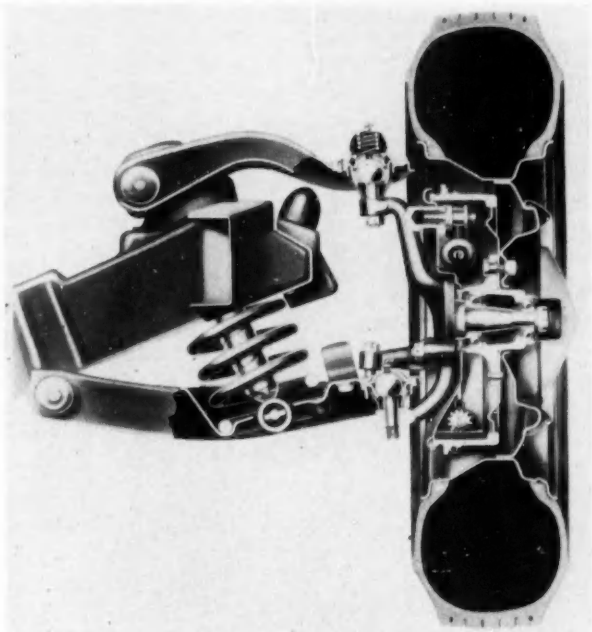


The 1955 chassis with six-cylinder engine. Note the Hotchkiss drive, outrigger rear suspension, and side-mounted air cleaner.

1955 CHEVROLET 90-deg. Valve-in-Head V-8

Condensed Mechanical Specifications

Bore (in.)	3.75
Stroke (in.)	3
Displacement (cu in.)	265
Compression ratio	8 to 1
Bhp	162 @ 4400 rpm
Torque (lb ft)	257 @ 2200 rpm
No. main bearings	5
Ratio—Bhp/cu in.	0.611



The new front suspension features spherical joints and a control arm geometry that is said to cancel out practically all of the objectional "dive" that often accompanies brake stops.

purchased with V-8's, includes a four-barrel carburetor and a dual exhaust system. It provides a top rating of 180-bhp, with all the extra performance that implies.

It comes as a surprise to learn that the traditional torque tube drive, characteristic of Chevrolet over the years, has disappeared. The 1955 chassis has been redesigned to adopt the Hotchkiss drive; and with it, entirely new suspension at the front and rear.

Tubeless tires are offered at no extra cost on all models.

From the standpoint of transmissions, Chevrolet has an interesting variety of options, including more rugged synchromesh transmissions, and an improved Powerglide. In addition, the company offers for the first time an optional over-drive installation.

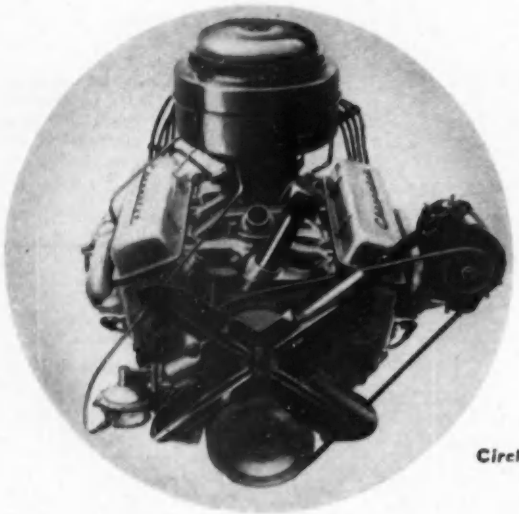
Steering has been completely revamped. In the first place, the manual gear is greatly improved by the adoption of the recirculating ball-nut type gear in combination with a relay linkage geometry that increases smoothness and reduces manual effort. Power steering, offered as optional equipment, features a new Saginaw linkage type arrangement.

From the standpoint of models, Chevrolet offers—The One-Fifty, Two-Ten, and the Bel Air Series—with 14 new bodies, including two-door station wagons. The complete line includes—two- and four-door sedans in all series; two-door station wagons in the One-Fifty and Two-Ten; four-door station wagons in the Two-Ten and Bel Air; utility sedan in the One-Fifty; club coupe in the Two-Ten; sport and convertible coupes in the Bel Air.

All series are mounted on a 115-in. wheelbase chassis; overall length of cars—195.6 in. for sedans and coupes, 197.1 in. for station wagons; height of four-door sedans reduced to 60.5 in. Front tread is 58-in. rear tread, 58.8 in.

The chassis frame is said to have 50 per cent greater torsional rigidity, although it is 18 per cent lighter. This was accomplished by using stiffer side rails, rearrangement of side members, and a more strategic location of engine and body mounts, all contributing to overall stiffness and rigidity.

In this connection, the three-point engine mounting used heretofore has given way to an arrangement of

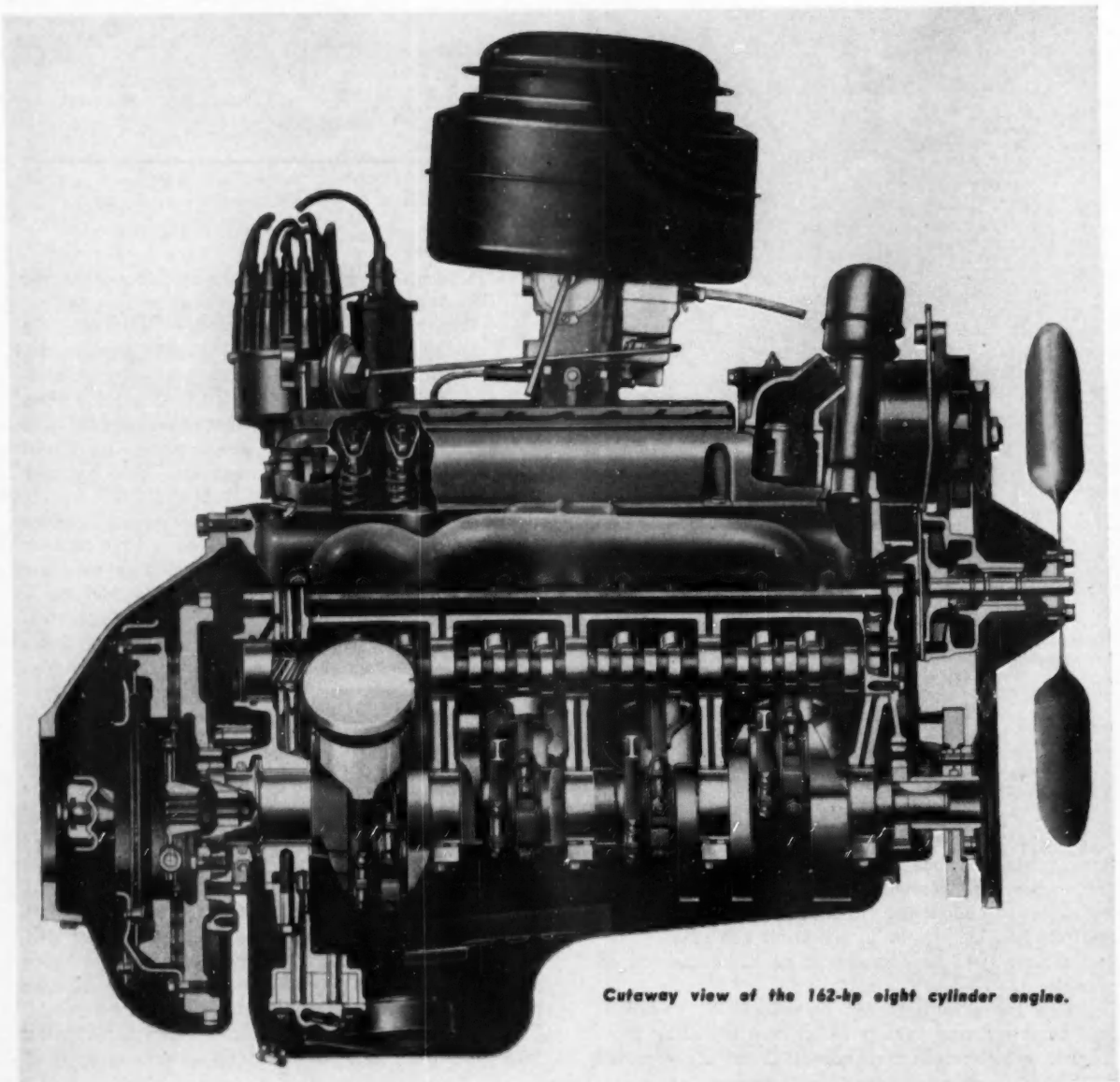


four engine mounts in such fashion as not to interfere with the natural balance of the engine. Front mounts are of strut-type, attached to brackets on each side of the block at the lower corners, angling to seats on the frame cross-member. Rear mounts are located between the lower rear edges of the clutch housing and short brackets from frame side members.

Front mountings have biscuit-size rubber pads mounted on a spacing tube above and below the brackets and frame cross-member. The pads between rear brackets and side rails act in shear during engine roll.

A Chevrolet version of the ball-joint suspension has been developed for the front end, as illustrated. One of its major features is a unique control arm arrangement in which the upper support arm is inclined with

Circle inset shows the Turbo-Fire 162-hp, valve-in-head engine.



Cutaway view of the 162-hp eight cylinder engine.

the leading edge higher than the rear. Any up and down movement due to severe brake reaction causes the spindle to turn on a radius about the lower ball-joint, due to the geometry of the suspension. This is said to have the effect of eliminating objectionable dive and has the same action, theoretically, as that of a radius arm for the front end.

In addition to its many known advantages, the ball-joint suspension simplifies the front end arrangement and reduces lubrication points to but four.

At the rear, the adoption of Hotchkiss drive has brought with it rear leaf springs 58-in. long. To gain additional lateral stability, rear spring mounts are outside the frame.

Synchromesh transmissions have more load-carrying capacity. The gear shift mechanism now is enclosed within the steering column. When overdrive is specified, the Borg-Warner unit will be used in conjunction with a high performance 4.11 to 1 ratio rear axle instead of the standard 3.7 to 1 ratio.

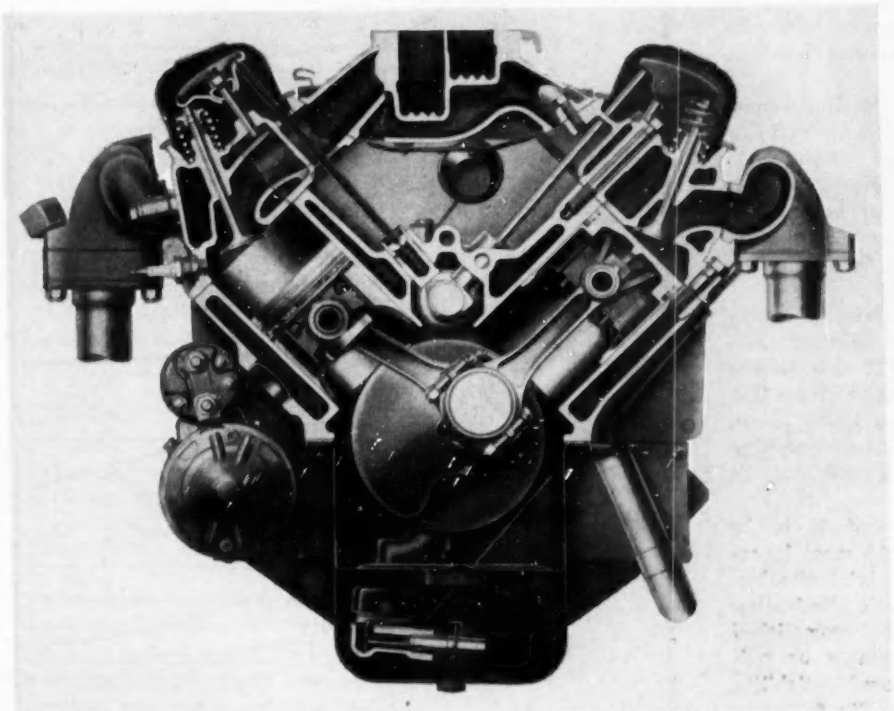
Powerglide remains substantially unchanged in major detail. However, it incorporates a new and more rugged double-wrap band for the low range drum to better handle increased engine torque. The selector lever has been made concentric with the steering column, selector positions being given on an illuminated quadrant on the instrument panel.

Coming to the details of the powerplants, it may be well to mention the several changes effected on the Six. Because of the lower silhouette dictated by the new car styling, it was found necessary to make the air cleaner side-mounted or an elbow from the carburetor. In addition, the fan and water pump were lowered to give more clearance with the hood. A larger fan, running at lower speed—0.95 times crankshaft speed, compared with 1.43 to 1—and a redesigned water pump have contributed to better efficiency and much quieter operation. Another item is a new fuel pump that guarantees constant fuel delivery. A floating oil pick-up ahead of the oil pump also has been added.

The new V-8 engine is designed specifically to provide a compact, lightweight package, suitable to mass production techniques. As a result it is said to be the smallest, lightest power package for its displacement this season. A cylinder block only 22-in. long houses a displacement of 265 cu. in., with bores of 3.75 in. This has been achieved by skillful proportioning and maximum utilization of metal and space. Low overall height also is emphasized, this being obtained by building the minimum structure about the short—3-in.—stroke. This feature is further enhanced by introducing a unitized intake manifold and tappet chamber cover.

The short, compact, and extremely rigid integral cylinder block and crankcase structure is tied together at front and rear by full depth panels, the rear face being well-blended across the full width of the casting. The three intermediate main bearing bulkheads also tie into the cylinder banks to produce great rigidity. All clutch housing fastenings are attached to the corners of the block in areas of solid major structural sections so as to minimize deflections and stress concentrations.

Details of the valve mechanism, pistons, floating oil intake, etc., are shown in this cutaway view of the new V-8 engine.



The five-bearing crankshaft is a steel forging with integral counterweights. Its short length, coupled with large journal overlap results in unusual stiffness and rigidity. The low weight pistons and connecting rods permit the development of small OD counterweights which are fully cheeked and turned to permit nesting of the slipper-skirt pistons. Main bearings, of precision replaceable type, have

(*Turn to p.* 118)

Defense Plane Production Among Topics Panelized at SAE Aeronautic Meeting

By
R. Raymond Kay

NEW design ideas, new trends, and new problems in aircraft manufacture crowded the talk in meeting rooms and corridors at SAE's annual National Aeronautic Meeting. The October sessions brought leading aeronautic and automotive engineers to Los Angeles, the "aircraft manufacturing capital."

Development of a flexible program for producing defense planes in the event of war got two solid days of panellizing at the Aircraft Production Forum. Experts from the aircraft industry throughout the country explained the techniques of and answered questions about tooling economics, in-plant communication, metal forming, manufacturing cost control, tabulating in industry, machining, change control, education in industry, quality control, and electronics.

Chief Engineer Edward H. Heinemann, El Segundo Division, Douglas Aircraft Co., Inc., called for "fundamental simplicity" in design of combat aircraft. More and better combat planes at less cost can be provided if an airplane is conceived as a single unit and if lightness in weight is emphasized ceaselessly, he urged.

In an excellent paper, "Design of Lightweight High Performance Military Aircraft," Heinemann said, "If this design philosophy is followed, it can be shown that 2400 airplanes each weighing 15,000 lb can be built for the same cost as 1000 weighing 30,000 lb each." Declining unit cost is shown in Fig. 1.

If "fundamental simplicity" is to be achieved an airplane's weight must be reduced by design ingenuity, miniaturization, and, in some cases, by actually eliminating equipment items. This can be accomplished without sacrifice of performance or reliability, he claimed. Increased reliability with fewer parts is shown in Fig. 2.

FIG. 1

Typical cost learning curve

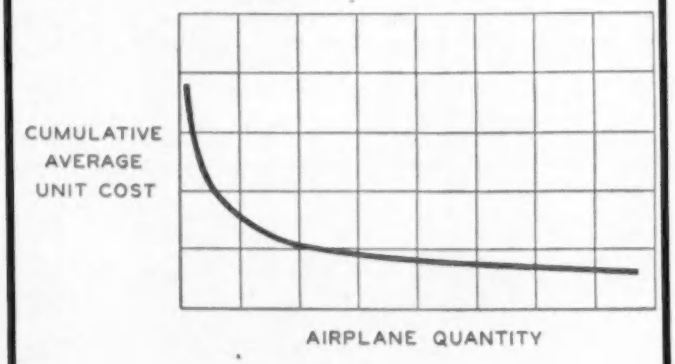
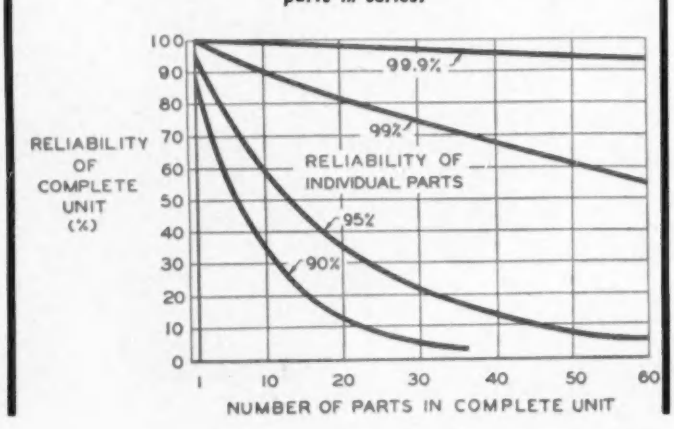


FIG. 2

Reliability as a function of number of parts (all parts in series)



The Navy's A4D Skyhawk, smallest and lightest U. S. jet combat plane, which was designed under Heinemann's direction, embodies many excellent examples of weight saving: a 17½-lb air conditioning unit was redesigned to weigh 5½ lb; 172 lb of electronics was repackaged to 136 lb; the pilot's ejection seat weighing 98 lb was reduced to 40; a gun sight was brought down four pounds; and over seven pounds were saved in redesign of an electrical plug.

In several cases numbers of parts were reduced by half, and weights of entire components reduced to less than half.

A good example of "fundamental simplicity" in the Skyhawk are its wings, which do not fold as is customary in carrier aircraft. "Weight was reduced at the beginning to the point where the bomber became so small its wings were not required to fold for handling aboard a carrier," Heinemann stated.

Each extra pound needs 10 more pounds in powerplant and structure to support it. At $50 a pound, it costs $500 to incorporate one more pound into a plane.

If we are going to have flexibility for defense, we must design for flexibility of manufacture, according to H. E. Herdrich, assistant manager, Industrial and Plant Engineering, Northrop Aircraft, Inc. Some suggested ways to effect flexibility: (1) Plan the production breakdown in the preliminary design stages; (2) Exhaust every possibility of providing manufactured production breaks. Without jig requirements you can get more production breaks per lb of added weight than with bolted manufactured breaks; (3) Design and plan installations as packages so maximum amount of subassembly can be done outside of the airplane; (4) Use techniques, or develop techniques, where manufactured breaks can be joined by squeezing the fastenings rather than beating, thus minimizing metal flow and maintaining fit; (5) Design and plan break points with greatest possible tolerances; (6) If at all possible, design and plan installation to go over frames and webs instead of through them; if not possible, provide large enough cutouts to pass all necessary components of the assembly being installed; (7) Plan the assembly line jobs at same multiple of the ultimate production interval, if the ultimate production interval is 16 hours plan eight or four hour jobs; (8) Design and plan the airplane to provide the maximum amount of bench subassembly, both structural subassemblies and installation subassemblies; (9) Plan and design assembly tools with maximum accessibility—single plane jig structures, not box jigs.

The Forum was told that flexible automation is inevitable in the aircraft industry, with automatic controls making it possible to utilize fast machines even for limited quantities and short runs.

Design of wings for aircraft, especially those intended for supersonic flight, has become a matter of departmentalized engineering. No one person can command the necessary knowledge of flutter, dynamics, materials, thermodynamics, and producibility, William J. Conway, Lockheed Aircraft Corp., Burbank, Calif., pointed out. Mr. Conway warned that the judgment and ability of many experts must be coordinated, since emphasis can be put upon any selected requirement only at the expense of overall quality and performance.

"A successful design," he commented, "requires prudent evaluation of all the factors involved, and in this the designer holds the unique and important function of coordinating and placing in proper focus all of the special criteria of the experts."

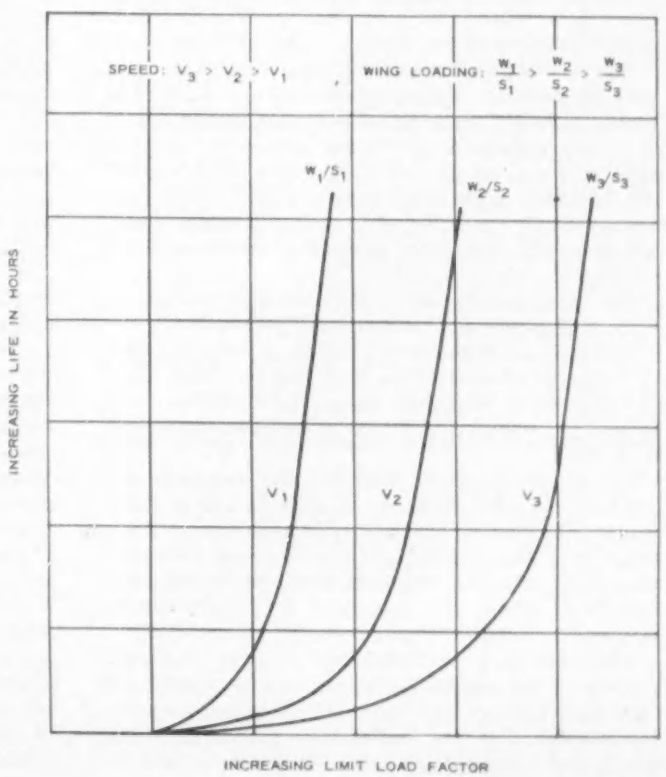
Mr. Conway added that wing design must consider forces for aerodynamics, stiffness for aeroelasticity, distortion for thermoelasticity, minimum weight for flyability, and costs for producibility. He said that while simultaneous solution of all these primary problems can become complicated and discouraging, it can be done with reasonably satisfactory results by establishing definite relationships between essential requirements.

Modern methods of making flight load measure-

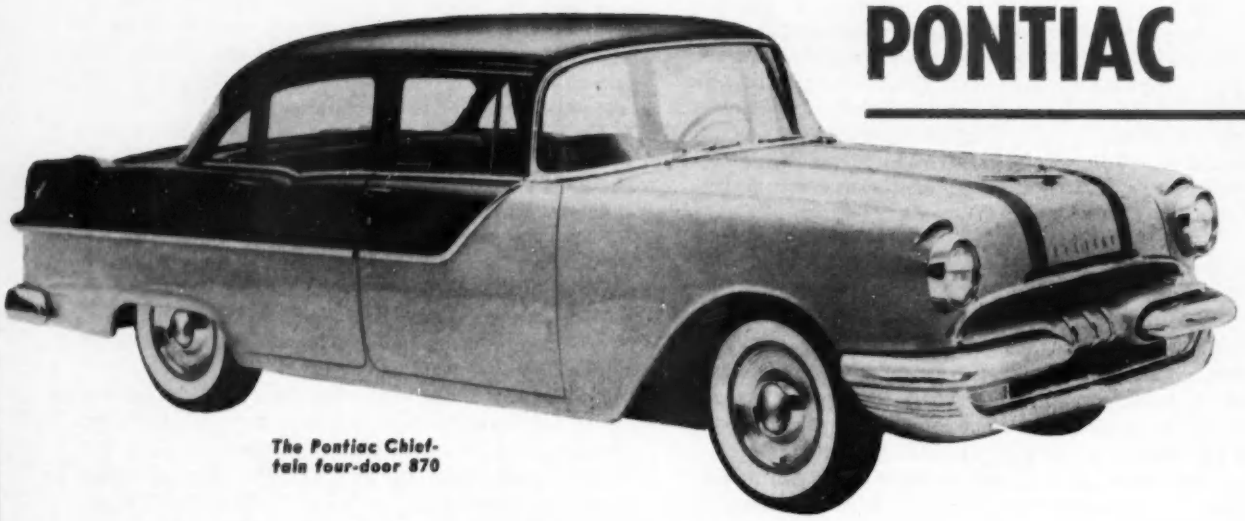
(*Turn to page* 98, *please*)

FIG. 3

Hours of life vs. limit load factor



PONTIAC



The Pontiac Chieftain four-door 870

THE 1955 model year finds Pontiac ushering a new era with the introduction of its high compression OHV V-8 engine. The new engine has had the benefit of the equivalent of some 3-million miles of dynamometer and road testing before being released for production. Incidentally, it will be produced in a new Pontiac engine plant equipped with the latest types of transfer machines and special equipment, all tied together with automatic controls and Wilson automation. Production facilities for this V-8 will vie with anything found in the industry to date. Following practice in other GM divisions, the V-8 has been equipped with a 12-volt electrical system.

The new bodies have a low, streamlined silhouette with the front-end styling accentuated by massive dual impact bars and grille bar. Headlamps display a new treatment with air crescents above them. Twin silver streaks, a popular feature of Pontiac's "dream cars," the Bonneville Special and the Parisienne, sweep back from the radiator grille of the 1955 Pontiacs, terminating at the cowl-wide passenger compartment air intake.

The new Pontiacs will be available in two series, the Star Chief Series and the Chieftain Series.

The Star Chief series is 210.2 in. in overall length on a 124 in. wheelbase. The Custom Star Chief model is available in four-door sedan and Catalina. The Deluxe Star Chief is produced in four-door sedan and convertible.

The Chieftain series, with 122 in. wheelbase and 203.2 in. overall length, is available in 870 and 860 models. The Chieftain 870 body styles include the Catalina Coupe, two and four-door sedans, and four-door station wagons. The Chieftain 860 comes in two and four-door sedans and two and four-door station wagons.

All models have lower hood lines exposing both front fenders to the driver's vision. Hip and shoulder room have been substantially increased by redesigning the car interior. The new bodies with panoramic windshield, and increased glass at side and back have 26 per cent more "see through" area. Station wagons have wrap-around rear windows. In all, 12 body styles are offered for 1955 by Pontiac.

Since the Pontiac V-8 follows a succession of high performance engines introduced by other producers during the past few years, it is of interest to learn that experience and imagination have been coupled to endow it with many unique features. A sampling of some of these is given below:

1. Ball pivoted, stamped rocker arms, simplifying the valve mechanism and eliminating the usual rocker arm shafts and brackets represent a Pontiac "first."

2. Completely machined combustion chambers, featuring a large quench area, provide accurate control of volume.

3. Quad-gallery full pressure lubrication system, assuring high pressure to all bearing points, is said to be unique in concept.

4. Unique pressure-suction type crankcase ventilation system, providing what is said to be an ideal flow pattern is another "first."

5. Tapered valve guides, a standard feature on Pontiac in-line engines, is continued on the V-8.

Condensed mechanical specifications shown here give the most significant data on this engine. It may be noted that the standard engine, used with Hydra-Matic drive, is rated 180 bhp with premium fuel. The same basic engine, with compression ratio of 7.4 to 1, supplied as optional with the synchromesh transmission, will operate on regular fuel. The only change required to convert to the lower compression ratio is a set of pistons with concave heads.

The engine is extremely compact from the standpoint of installation dimensions. This results naturally from conscious attention to design details; also from the over square bore-stroke ratio, stroke being only 0.87 of the bore. Not only does this arrangement provide for lower overall engine height, it is also a major factor in reducing friction. Coupled with this is the relatively large displacement which accounts for higher torque at lower speeds.

for '55

has V-8 Engine and new styling

Right front quarter view of the 180-hp Strato - Streak engine

Consider now the basic design details. Pistons are of slipper skirt, Autothermic steel strut design, cam-ground and tin-plated, weight-balanced to a tolerance of 1/16-oz.

Pontiac employs a three-ring setup with two tapered compression rings, 0.078 in. wide, with top ring being chromium-plated. The steel oil control ring, 0.186 in. wide, is of the latest four-piece design, having the scraping edges chromium-plated.

Piston pins are offset by 1/16 in. to insure a gradual change in the thrust pressure pattern. This is said to reduce piston slap and assure quieter engine operation at warm-up. Piston pins of floating type are retained by means of snap rings.

Connecting rods are of I-beam section, subjected to two balancing operations to provide uniform weight within a tolerance of 1/16 oz at both ends. Piston pin bushings are of bronze. Connecting rod bearings are of interchangeable, steel-backed Durex type.

As seen in the cross-sections, the cylinder block is very compact, made inherently rigid by substantial ribbing and casting design which assures a solid foundation. The fuel pump is mounted low on the left side at the forward end, directly in line with the air blast from the fan, thus minimizing the effects of vapor lock. In addition, the fuel pump is farther from the exhaust pipe. Moreover, this arrangement insures better generator support. Fan belt life is at a maximum, since the most severe turn in the belt occurs on the slack side. It may be noted at this point that a single, ⅜-in. high capacity V-belt is employed for driving the fan, water pump, and generator.

The five-bearing crankshaft is made of a counterweighted steel forging, heat-treated. Besides its inherent rigidity—only 25.7 in. in length—additional rigidity is imparted by providing a ¾-in. overlap between main bearing journals and crankpins. Crankshafts are balanced dynamically, tolerance at assembly being specified at 0.5-oz in. Main bearing journals are 2½-in. in diameter; crankpins, 2¼-in. Main bearings, of removable precision type, are steel-backed Durex.

The harmonic balancer, similar in design to that used on the inline 8, is built into the fan drive pulley and mounted on the front end of the crankshaft. It consists of a 3-lb, 13-oz steel weight, retained to the pulley assembly by a system of three banks of flexible springs.

The camshaft is 22.4-in. long, cast from tough alloy

CONDENSED MECHANICAL SPECIFICATIONS
1955 PONTIAC V-8 ENGINE

Type	Overhead valve, 90 deg V-8
Bore (in.)	3.75
Stroke (in.)	3.25
Displacement (cu in.)	287.2
Compression ratio (Standard)	8 to 1
(Optional with synchromesh transmission)	7.4 to 1
BHP 8 to 1 CR	180 @ 4600 rpm
7.4 to 1 CR	169 @ 4400 rpm
Torque (lb-ft) 8 to 1 CR	264 @ 2400 rpm
7.4 to 1 CR	256 @ 2400 rpm
Firing order	1-8-4-3-6-5-7-2
No. main bearings	5
Bhp/cu in. ratio 8 to 1 CR	0.625
7.4 to 1 CR	0.588

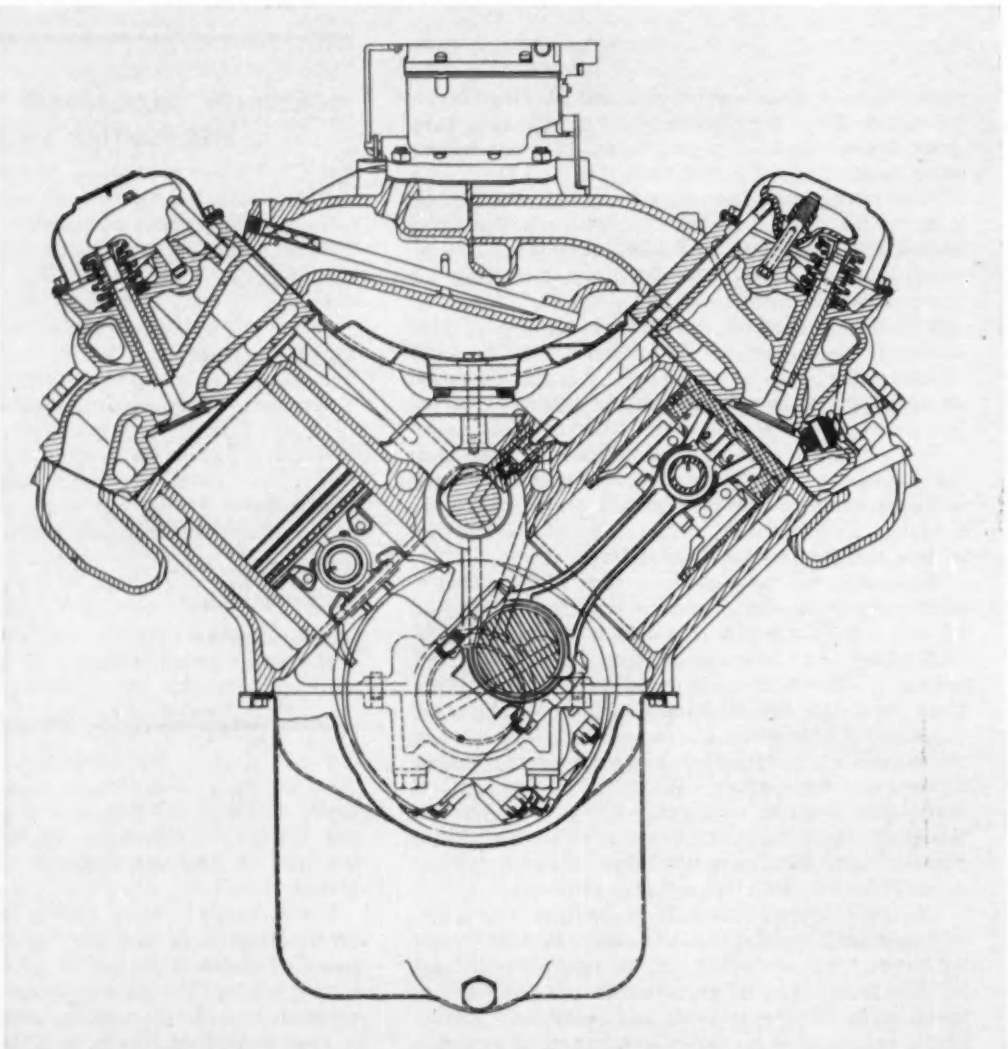
iron. Cams are hardened and taper-ground with the high side of the cam toward the rear. Camshaft drive is by means of a 60-link, one-inch Morse chain. The 42-tooth camshaft drive sprocket is made from cyanide-hardened cast alloy iron, while the 21-tooth crankshaft sprocket is of case-hardened steel.

The cylinder head, made of alloy iron, contains the valve mechanism as seen in the transverse cross-section. The advanced type of combustion chamber is wedge-shaped in this view, having its greatest depth near the outer edge of the cylinder bore where the spark plug is located. Its major volume is offset outwardly from the centerline of the piston. The spark plug is located near the intake valve to provide for precise ignition and adequate plug cooling. The combustion chamber is completely machined, using a single cutter, to assure precise volume. The quench area covers approximately 35 per cent of the piston head and is 0.055 in. deep.

Coming to the valve train, it is noted that the alloy steel intake valves have a head diameter of 1.78 in. with a 30-deg angle seat; the high chrome-nickel alloy exhaust valves have head diameter of 1.50 in., with seat angle of 45 deg. The valve train incorporates some outstanding features many of which are unique with Pontiac. Valve operation, naturally, starts with the hydraulic valve lifters. Push-rods are tubular with cyanide-hardened ends and provide for pressure lubrication at both ends.

Perhaps the most distinctive feature of the valve train is the first example of ball-pivoted rocker arms, cyanide-hardened stamped steel cups replacing the conventional cast or forged rocker arms. As shown, they are stud-mounted to the cylinder head with individual ball seats.

Valves are fitted with dual springs. Tapered valve stem guides are continued, being reamed after installation to assure accurate taper and concentricity. This design allows for maximum clearance at the head end to permit for valve stem expansion.



Near Right—Transverse section of the new V-8 engine showing valve mechanism, piston construction, etc

Far Right—Longitudinal sectional view shows construction of vibration damper arrangement of bearings, design of intake manifold passages, and other details

The fuel induction system has been developed for maximum economy coupled with efficient distribution of the mixture. The carburetor is of dual-design, featuring side bowl construction. It incorporates an automatic choke assisted by a new type baffled stove in the intake manifold, an automatic throttle opener to provide higher initial idle speed, and an economizer control to assure quick, lag-free acceleration. A heavy duty oil bath air cleaner and silencer is specified as an accessory.

The intricately cast intake manifold stems from considerable design and experimental work, resulting in the development of short and practically equal length fuel passages. These passages are extra large and have well rounded turns so as to reduce surface friction.

To assist in more complete vaporization of fuel, a stove is included in the manifold directly below and surrounding the risers which lead to the carburetor. When the engine is cold, a spring-operated, temperature-sensitive heat control valve permits the exhaust gases in the right hand manifold to pass through the stove.

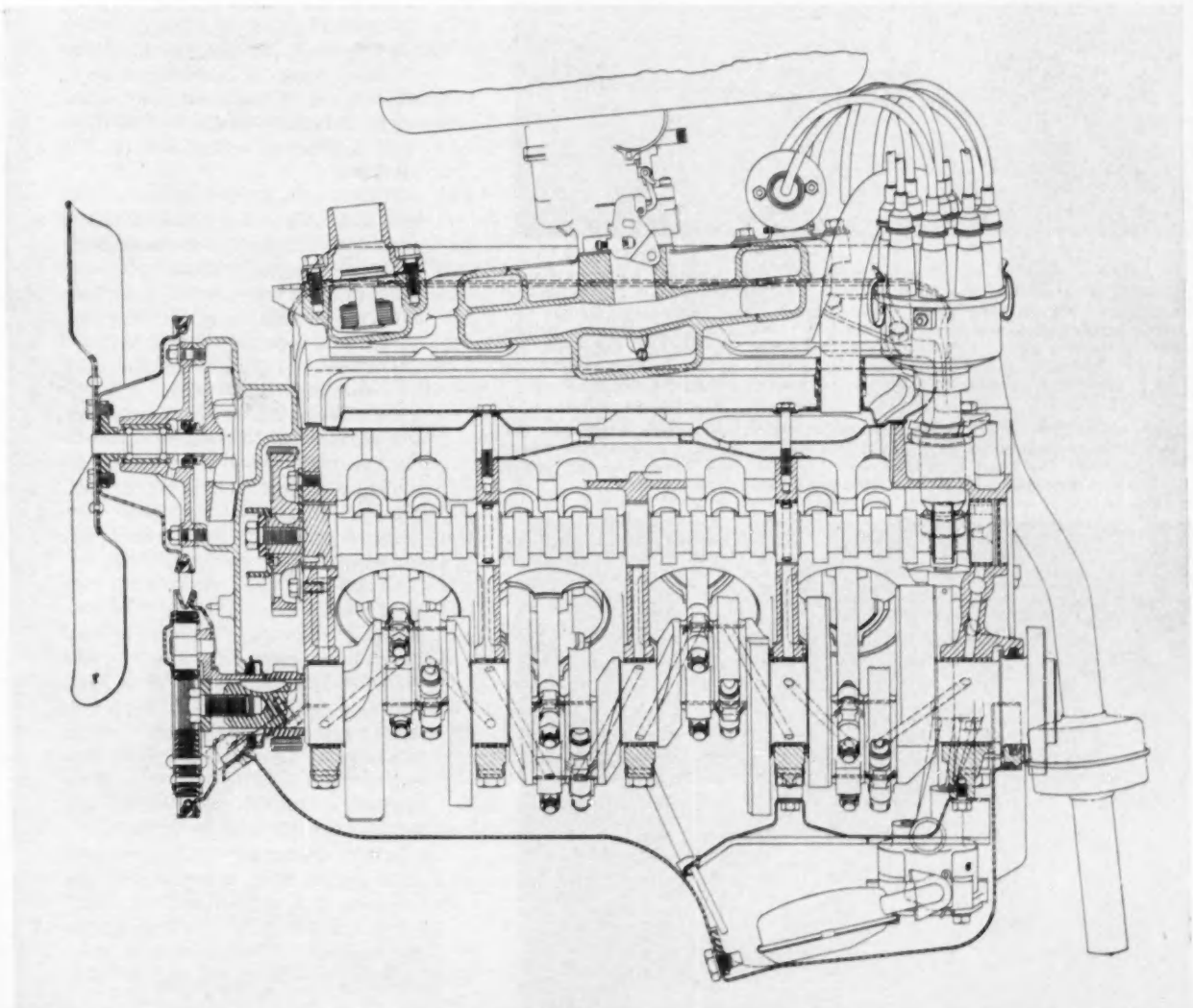
The exhaust system consists of two cast iron manifolds, one for each bank. Each has three generous sized ports mating with exhaust channels in the cylinder head, individual ports serving the end cylinders.

A tubular steel exhaust pipe on the right hand side collects the gases from both manifolds, the left hand side being connected by a pipe running under the engine, joined by a pipe from the right hand manifold.

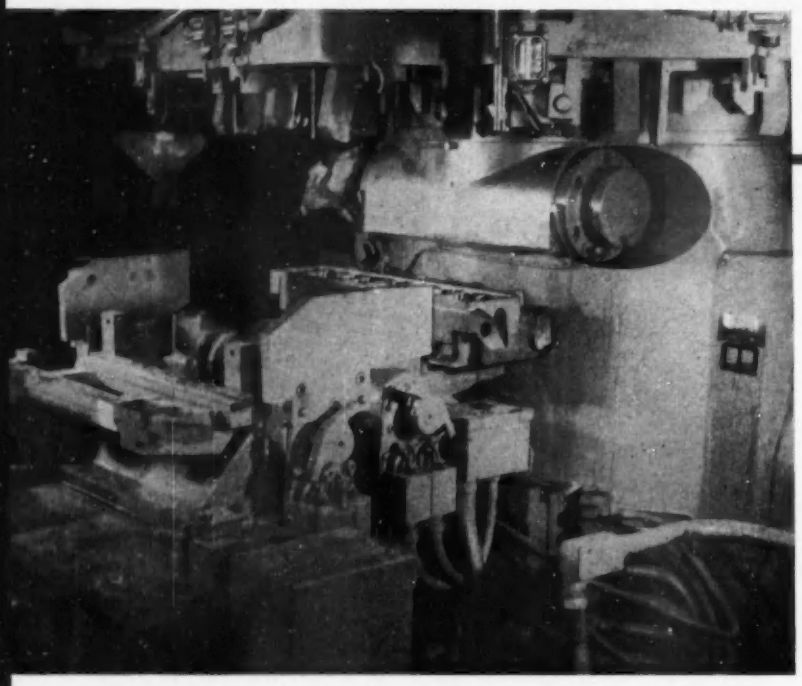
As mentioned earlier, the engine is equipped with 12-V ignition. With this system, appreciably greater secondary voltages are available at the spark plugs; generator capacity is greatly increased and thus can handle the ever-increasing electrical loads more effectively; while the new 12-V starting motors are capable of faster cranking speeds.

Quad-gallery lubrication is a fresh concept de-

(*Turn to page* 104, *please*)

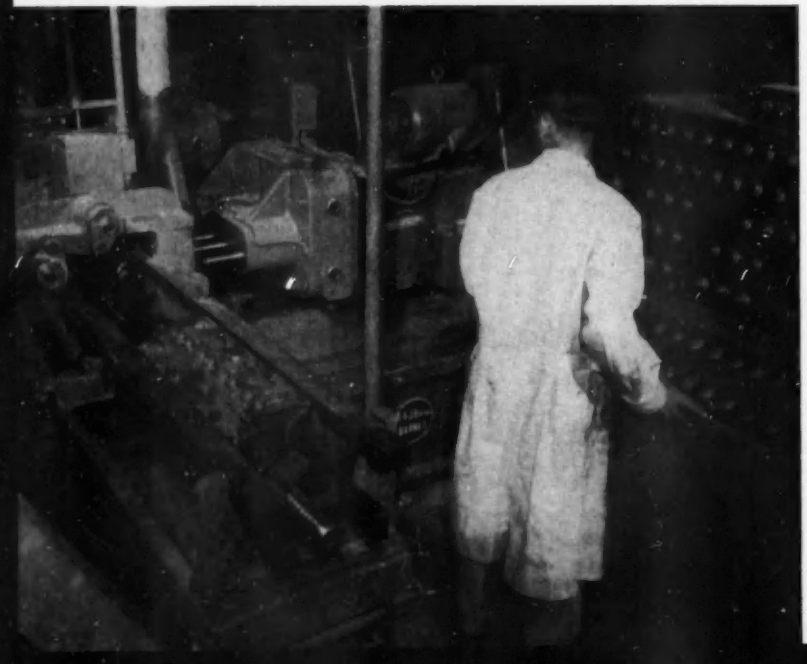


PACKARD 1955 V-8's in Production



This Ingersoll rotary type transfer machine is the first unit on the cylinder head production line. The head is shown in position during the unloading operation. The fixture above the head is equipped with large clamps and targeting dowels for locating and clamping the workpiece during the various operations carried out by the machine. When the workpiece is unloaded, the bottom fixture is elevated to meet the machining fixture and then drops back into position to move the head along the production line.

The transfer bar is shown in position to move a cylinder head into the first machining operation of this multiple station W. F. & John Barnes transfer machine. The head is loaded with the joint face down and the intake manifold pads to the right-hand side of the machine.



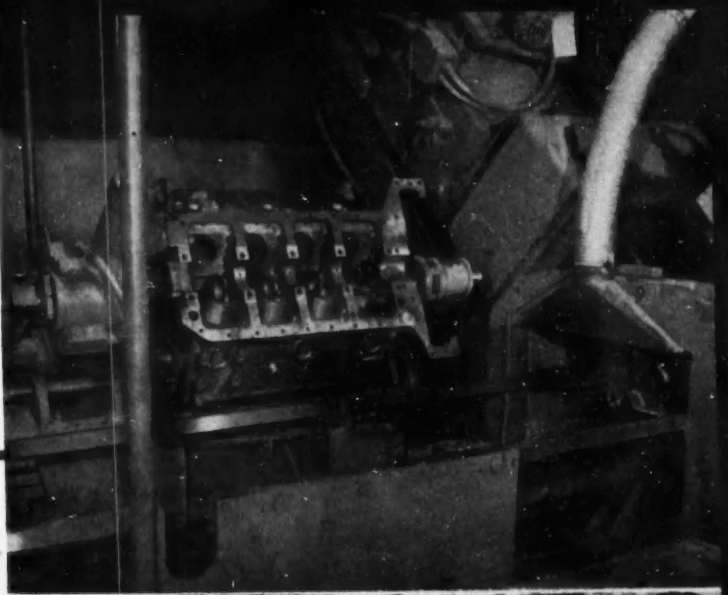
Latest Automated Equipment Has Been Installed in New Utica Plant

OVER $20 million has been spent for new plant and production equipment to produce two new Studebaker-Packard Corp. V-8 engines at the former jet engine plant of Packard in Utica, Mich. Their power output and design will not be disclosed until the announcement of the new car models sometime in January. It is understood, however, that both engines will be well over the 200 hp mark.

Having just started on the tooling program this past April, Packard completely cleaned out the machinery for jet engine manufacture and brought in the latest automatic equipment—which is completely vented for cast iron and dust removal—for passenger car engine manufacture so that by late October approximately 50 engines per hour were rolling off the line. Throughout all machining operations there is a chip and coolant conveyor for central chip disposal. Mechanical Handling Systems, Delpark, and Frostrode equipment is used for the installation.

Completely automated lines are used for both the heads and the blocks. All tooling is preset as well as machine speeds and feeds in the transfer units utilized for this modern layout. Machines are equipped with tool controls and boards throughout. Packard has both size engine blocks going over the same transfer line up to finish boring and honing operations on the cylinders.

After qualifying the purchased castings, the block is loaded with the top side up and the front end leading into an 11-station Ingersoll transfer machine. When the block is located at the second station by auto-

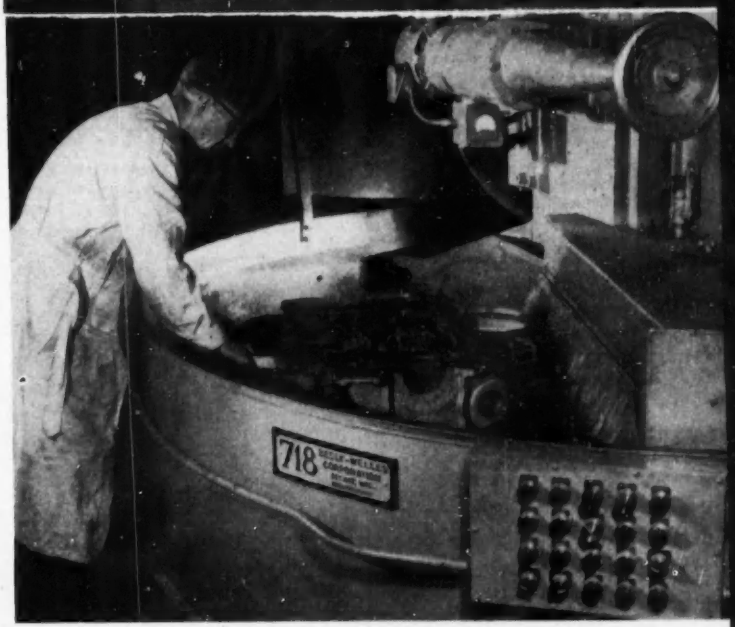


Cylinder blocks are picked off the transfer line of this Greenlee machine by an automation device which automatically rotates the workpiece for chip removal. The machine is vented for cast iron dust removal as the cylinder block moves along the transfer line.

By Thomas Mac New

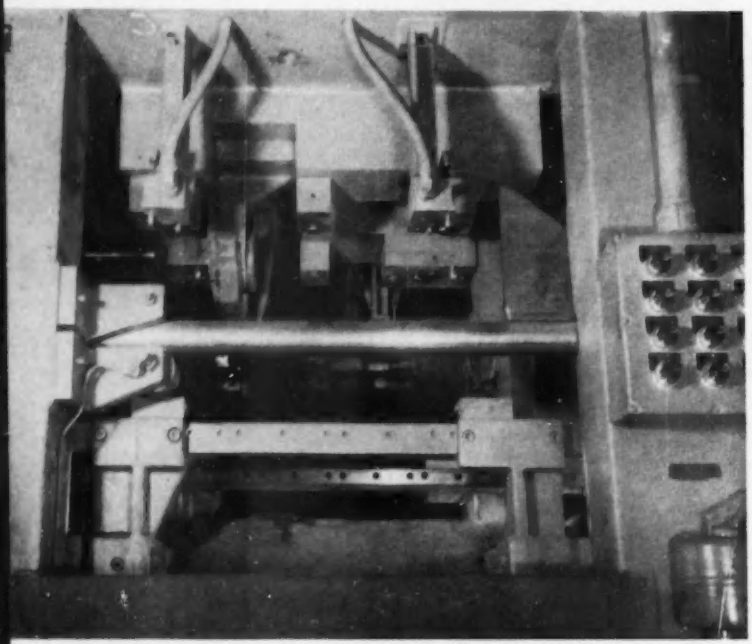
mation, two 4½ in. diam carbide mills machine the locating pads. The block is then automatically turned 180 deg vertically so that the pan rail is in an upright position. The half crank bearings are rough bored, and the rear cam bearing is core drilled. A the block moves along, a rough milling cut is taken on the pan rail face using 9 and 10-in. cutters equipped with carbide blades. Rough milling operations are then carried out on the bearing cap seats, after which the pan rail is finished milled. Holding a tolerance of ±0.001 in., bottoms of the bearing seats are finished by milling, while the bearing cap seats are broached to width holding ±0.0005 in. At the next station, HSS tooling is utilized to drill, chamfer and ream two ¾-in. locating holes, drill eight bearing cap holes, and drill and chamfer one oil hole. The block is then manually inspected for flatness and height of the pan rail surface and for the width of the bearing caps. Upon leaving the Ingersoll, the block is again inspected wherever machined with various types of gages.

Coming into the second transfer machine, the block is loaded with the pan rail up and the front end leading. Milling cutters are used to machine the front end of the crank bearings, and the rear end of the crank bearings, as well as the front end of No. 1 cam bearings. Notches 0.190 in. wide are then milled in the crank bearings. At the fifth station of this machine, the bearing lock notches are inspected. After the drilling of some 27 holes at the bottom of the block, the workpiece is moved to a unique turnover device for chip removal. The drilled holes in the pan rail and bearing cap

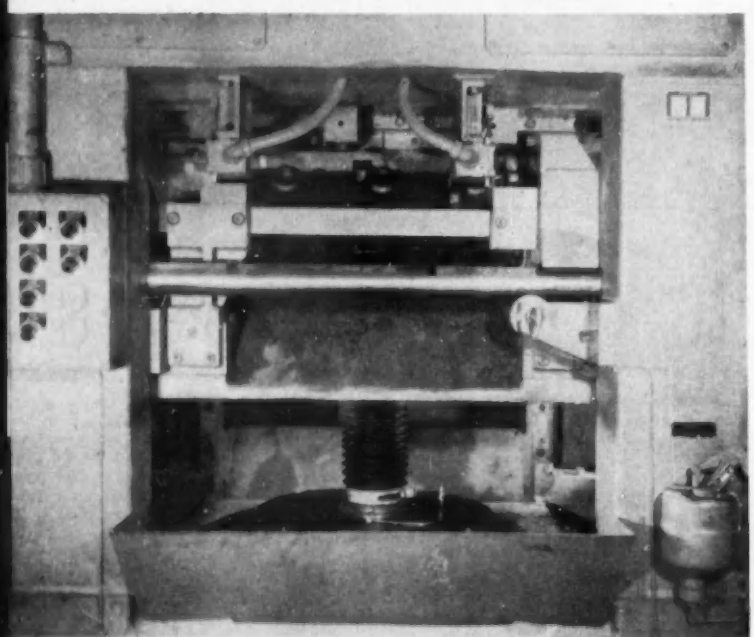


A Besly-Welles grinder is used to finish the mounting face of the flywheel housing. This is one of the few operations in the completely modernized Packard plant in which the workpiece is not automatically conveyed in and out of the machining operation.

Bearing caps are machined with this high-production Lapointe horizontal broach.



At this station of one of the Ingersoll machines, the cylinder block camshaft bore is reamed. The fixture shown resting on the bed of the machine is automatically elevated into position, and the workpiece is targeted from above before it is clamped in position.



The first boring operation on the camshaft hole shows the block in a raised position. A similar procedure is carried out for boring the main bearings.

seats are then inspected by probing. Drilling, chamfering, and reaming operations are carried out at the next two stations before the workpiece is automatically unloaded and sent through an inspection station.

The block is then turned 180 deg vertically so that the top is right side up and the front end leading as it enters a seven-station transfer type Ingersoll. Milling cutters equipped with tungsten carbide blades rough and finish mill the top of the block and the intake manifold surfaces. Cylinder banks are then rough and semi-finished milled using 11-in. diam carbide equipped mills. After this operation, the blocks are selected automatically according to the size of the cylinder bore. The smaller blocks are bored at the first station of this operation while the larger blocks pass through this phase and are bored at the ensuing station. Again, after the blocks are automatically removed from the transfer machine, they undergo various inspection procedures.

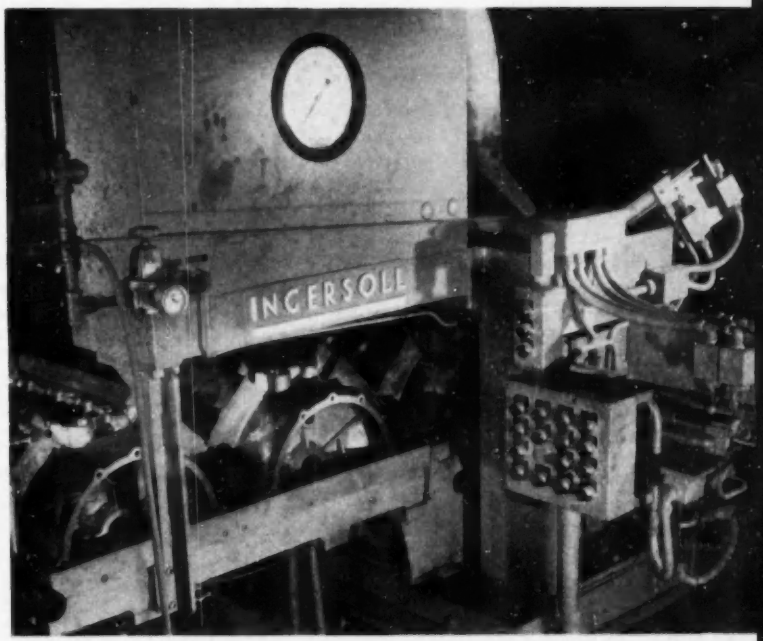
At the first station of the subsequent machine, which is another Ingersoll, the block is turned 90 deg horizontally so that the front end of the block is toward the left side of the machine. At the first machining station, the front end of the cylinder block is rough milled while the flywheel housing face is also being roughed out. Finish milling operations are then carried out on the front end while semi-finishing procedures are performed on the flywheel end. After the milling operations, various boring, drilling, and chamfering operations are performed at the next several stations. Next, the workpiece undergoes an air check for leakage in the oil gallery holes. If the block does not pass this inspection, it is automatically rejected by automation.

Blocks are then moved into an 18-station Greenlee with the pan rail up and the front end leading. First machining operation in this unit is to rough bore the core plug holes and drill angular oil holes in the main bearings. In subsequent operations, the core plug holes are finished machined and further drilling operations are performed on oil holes, water drain holes, and engine mount holes. Midway through the machine, the cylinder block is rotated 360 deg to dump the chips. After finishing the oil holes in the main bearings, the block moves along for tapping operations. Once again, it is turned 180 deg vertically so that the pan rail is down. Holes are drilled for the tappet cover and baffle assembly as well as the tappets. When the workpiece is unloaded from the Greenlee, it is once

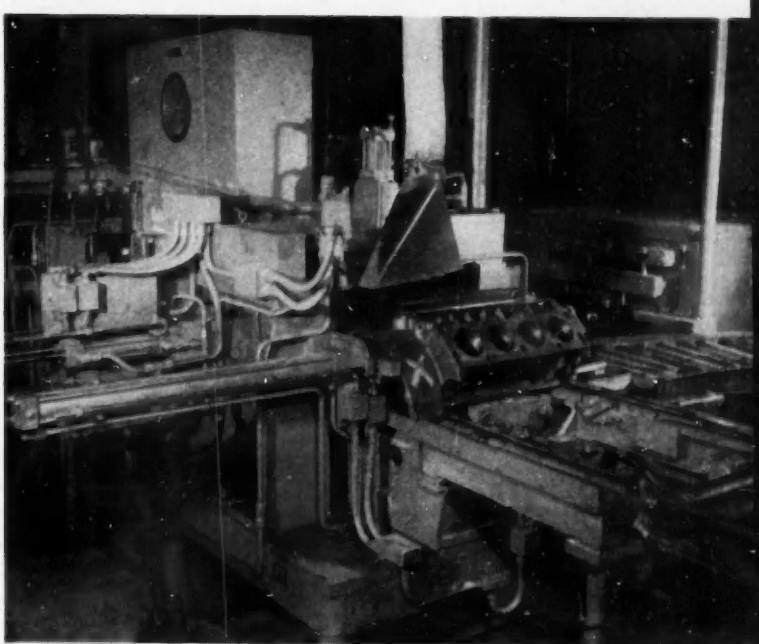
again thoroughly inspected — primarily with probing and go no-go gages.

Another Greenlee 18-station automatic transfer machine is used for further material removal operations such as drilling and countersinking holes on the top of the block. The distributor hold-down screw hole is drilled, as well as 16 tappet oil lead holes, 16 tappet holes, cylinder bolt holes, various water holes, and miscellaneous oil holes. Also, the tappet holes are rough bored and chamfered. This Greenlee is also equipped with a unique compound turnover fixture for dumping chips out of the processed work.

Complete tapping operations are carried out in the next machine, which is a 15-station Greenlee. In addition to tapping, however, the 16 tappet holes are semi-finished and finished reamed to 0.905 in. diam. The finished size of the tappet holes is held to ±0.0005 in. At the ninth station of the Greenlee, the cylinder block is turned 90 deg vertically, thereby presenting the pan rail face to the right-hand side of the machine. This enables the tooling to tap the main bearing cap holes and the oil pan holes, as well as the tappet cover and baffle assembly, oil drain, and distributor hold-down holes. Again, the cylinder block is turned 90 deg vertically so that the pan rail face rests on the conveyorized portion of the machine, and then is rotated 90 deg so that the rear end is to the left-hand side of the machine. This enables the tooling to tap the bell housing, water pump outlet, and timing case cover holes. The block is then unloaded and thoroughly inspected using a Taft-Peirce Rotocheck power thread gaging unit, as well as miscellaneous go no-go gages and Merz model 60 air gages with jet type contact spindles. A fixture gage and stand with rollers is provided for checking the tappet holes, and cylinder bolt holes. The workpiece is then transferred through chip blow out and loaded into a washing machine for the necessary cleaning operations.



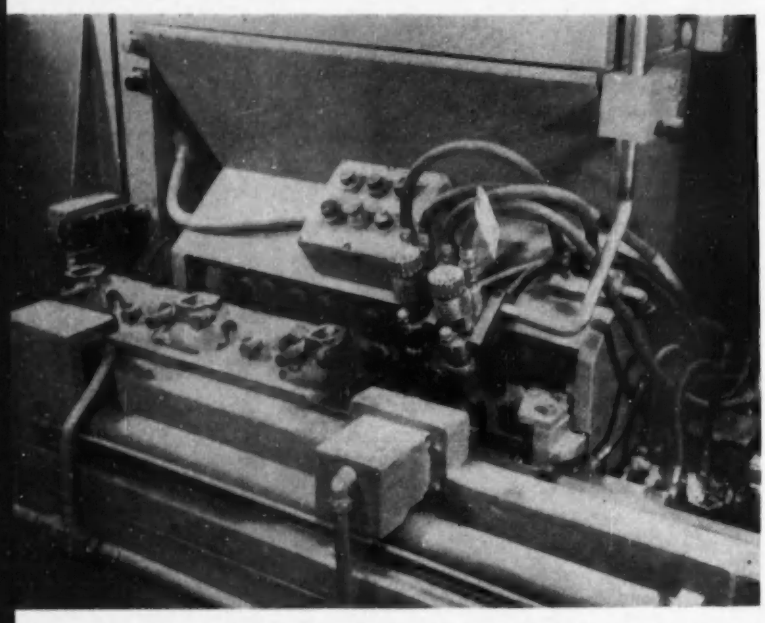
Blocks undergo a pressure test at this transfer point. If the workpiece does not pass, it is automatically rejected at the ensuing station.



At the end of this Ingersoll transfer machine, the block is given a thorough pressure test. The station shown here is for the automatic rejection of blocks which do not pass the inspection. Note the large air cylinder and the conveyor running transverse to the production line.

By means of automation equipment, the block is unloaded from the washing machine with the pan rail down and the flywheel end leading. A compound turnover and loading fixture places the pan rail up with the front end leading. An automatic probing unit is used to check out all oil holes from the top and the bottom of the block, also all holes in the front end and flywheel housing. Bearing caps are assembled with an Ingersoll-Rand air motor before the block is loaded into a 12-station Ingersoll transfer machine.

First, the block is inspected for clearance for the cam and crank boring heads used in the Ingersoll. Any blocks not having proper clearance are automatically ejected from the machine. Four cam holes are rough bored, and then the block is turned 360 deg for chip removal. At the next station, the first semi-finishing operation is carried out on the cam and main bearing bore, and the rear cam bearing is rough counterbored. Subsequently, the oil slinger and oil seal grooves are turned, using a carbide equipped grooving tool. The thrust bearing is then faced and chamfered, after which the block is again turned for chip disposal.



A Modern Industrial Engineering unit equipped with DeVilbiss guns is utilized for the cylinder head leak-down test. This is one of the final operations on the head production line.

Secondary semi-finishing operations on the cam and crank bore are carried out at the next to the last station.

Then the chips are dumped, and the cam bearing and angular oil lead holes are blown out.

After a very thorough inspection, the workpiece is loaded into another Ingersoll transfer unit. This 10-station machine finishes the cam and crank bearing bore, upper distributor hole bore, and semi-finishes and finishes the cylinder bores. Also, in this unit, the center hole is finish faced. A dowel hole in the rear end is reamed, and the banks are finished milled. Also, the top and bottom of the cylinder bores are chamfered. At the third station of this machine, after chips are dumped, a Pratt & Whitney Air-O-Limit five-station comparator is used to check the size, taper and out of round of the cam bearing bores, while another such unit is used to check the main bearing bores. The block is then turned 180 deg vertically so that the top side is up for the final operations in the transfer unit. Preceding the cylinder boring station of this machine, a selector unit is utilized to shuttle off the large displacement engine blocks to another Ingersoll four-station machine for finish boring the cylinders. When this operation is completed, the block once again returns to the main production line. At this point, a multiplicity of gaging equipment is utilized to thoroughly inspect the machined portion of the workpiece. Blocks are then taken through Micromatic Hydrohoners for honing cylinder bores. When the honing operations are completed, Sheffield universal Precisionaire air gages equipped with tungsten carbide spindle inserts are used to check out the cylinder bores. Once again, the block is sent through a washing machine to remove all foreign matter.

The workpiece is then sent through an eight-station transfer type machine which presses precision cam bearing babbit liners in place, applies sealer to the core plug holes, and presses the core plugs in place. This unit also is used to air test the cylinder assembly for any possible leaks. Finally, the locating lugs on the cylinder block are milled off. Another automatic reject device is included in this machine subsequent to the air test of the cylinder assembly. At this point, the flywheel housing, which has been previously ground in a Besly-Welles grinder, and drilled, bored and tapped in a Baker machine, is assembled to the cylinder block. After a few other finishing operations, the bore sizes are relayed to the piston stock room for selective fit of pistons. Blocks are then placed on a conveyor toward the assembly area.

Cylinder heads for the large displacement engine will utilize machined combustion chambers, but the smaller displacement engine, which has a combustion chamber of a different design, remain as-cast. The purchased castings are originally inspected to qualify the joint face and the spark plug holes. A very unique Ingersoll 12-station transfer type machine is used for the primary operations on the heads. This is a rotary type unit which rough, semi-finish, and finish mills the top face and combustion chamber side of the heads. Further milling operations are carried out on both sides of the heads, as well as the four combustion chambers on the large displacement model. In addition to the foregoing operations, various holes are drilled and reamed. This machine takes the cylinder heads and clamps them

(Turn to page 106, please)

Latest Vehicles of Communist Satellites

By David Scott

LEIPZIG, EAST GERMANY

THE Leipzig Fair in Eastern Germany provided another opportunity to see the latest output of the motor industries of the Communist world. Among the high spots of this event, which was held in September, were new aircooled Diesels, a farm tractor with adjustable tread and wheelbase, a large flat-bed trailer of unique design, a car with plastic fenders, and several new bus developments.

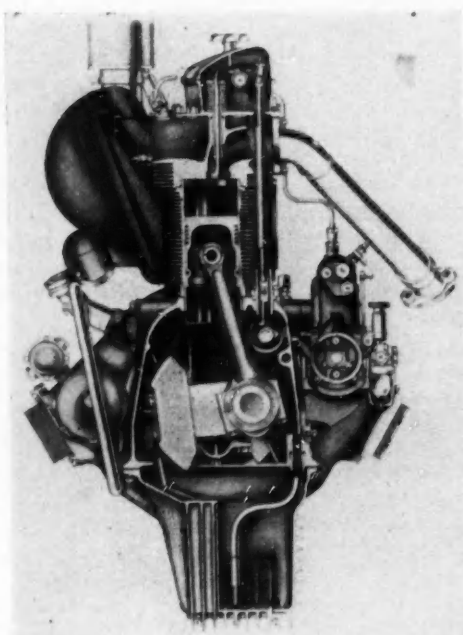
The European trend towards aircooled Diesels has been picked up in East Germany by the nationalized Phänomen works in Zittau. Long experience in aircooled gasoline engines by this plant has now been applied to Diesels, and the latest model is the Granit 32.

This four-cylinder, four-stroke unit is rated at 52 hp at 2600 rpm. Bore and stroke are 3.54 in. by 4.92 in., and piston displacement is 194 cu in. Cooling is by a double axial blower driven by V-belt from the crankshaft. Air passes through a large duct which extends along one side of the engine, then travels across the finned cylinders and heads.

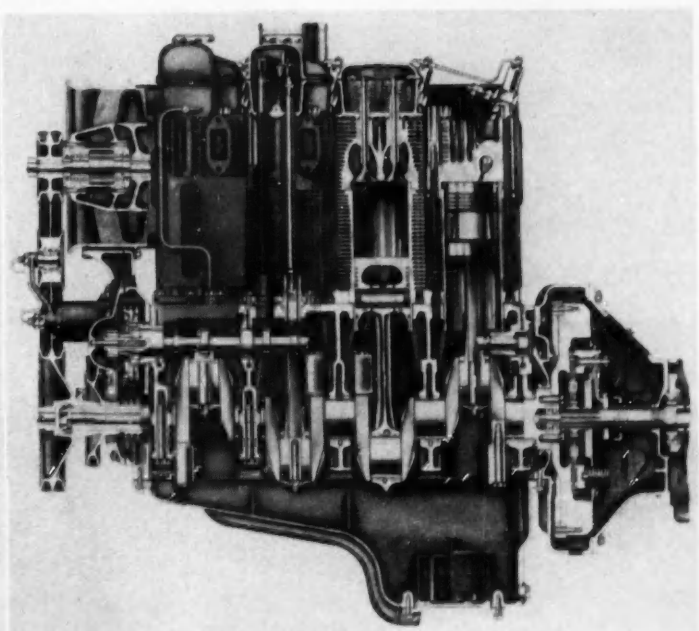
The engine, weighing 860 lb, is used on a two-ton chassis. A 55 hp gasoline engine of the same basic construction is offered as an alternative power unit. Design of this vehicle, supplied with 130 in. or 150 in. wheelbase, is otherwise conventional. Bodies available are drop-sided or panel truck, ambulance or small bus.

A smaller East German truck is the ¾-ton Framo, made in Hainichen, Saxony. Body styling has recently been improved, although the standard three-cylinder, two-stroke engine has been retained. The same engine, which develops 24 hp at 3600 rpm, is found with front-wheel drive in the IFA F9 car, which is now being exported on a modest scale to western Europe. Recent changes in this model include a one-piece curved windshield, redesigned cylinder head, and rear-positioned fuel pump. Bodies available are sedan, convertible, and station wagon.

An improved version of the IFA F8 car has also



Transverse cutaway view of the Granit 32 aircooled Diesel



Cutaway longitudinal sectional view of the Granit 32 aircooled Diesel. Note the axial blower driven by V-belts

been introduced. The pre-war coachwork of canvas-covered wood has finally been discarded in the de luxe version. Panelling is now all-steel, with plastic front fenders embodying headlamps. Engine is a two-cylinder, two-stroke unit of 20 hp driving the front wheels.

One new East German bus was the H6B/L 38-passenger powered by a six-cylinder Diesel rated at 120 hp at 2000 rpm. Body and chassis frame are integral, the part-wood construction of earlier buses having been abandoned in view of increasing exports to tropical countries. Net weight is 18,000 lb.

East Germany's IFA F8 is now built with plastic fenders and all steel body

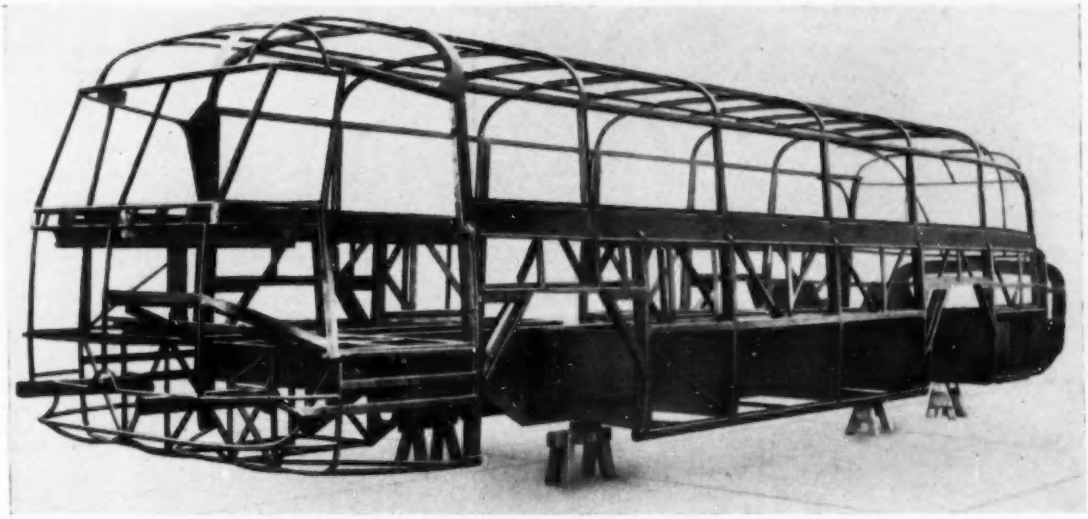
Among the East German tractors was the new RS 08/15 implement carrier. The frame consists of a single square-section central member which supports the farm tools between the axles. Wheelbase may be altered by repositioning the front axle support along the frame. Tread may also be varied. The single-cylinder, two-stroke gasoline engine of 15 hp works through a reversible 8-speed gearbox.

While the perlon-tracked crawler which was shown at Leipzig two years ago was not on view this year, it was learned that East Germany is continuing work on this development. The track is fabricated from synthetic fibers impregnated with Buna rubber. Much longer life and lighter weight than steel are claimed, as is resistance to stretching. It was stated that an 80 hp tractor of this design may be exhibited at the next fair in March. Meanwhile, a 120 hp crawler was stated to be scheduled for production in several years.

All these machines are products of State-operated factories. Several private manufacturers were exhibiting, the largest being Walter Hunger, Frankenberg, Saxony. Of particular interest was their 40-ton flat-bed transport trailer. This is carried on four double-wheels at the front and eight at the back. Rear wheels are mounted on a pair of twin-axle bogies which may be rolled clear of the bed when the trailer body is raised by built-in hydraulic rams. End of

Both tread and wheelbase of this East German implement carrier can be varied

Hydraulic rams of this 40-ton transport trailer are operated by a self-contained pumping unit



Integral construction of Hungary's Ikarus bus

Engine withdraws from front of Hungarian Ikarus 60 city bus

the trailer is then lowered to the ground to receive its mobile load. When the body is again jacked up the bogies are replaced. A small gasoline engine drives the hydraulic pump. Steering of the two front axles is effected by mechanical linkage from the tow-bar.

Hungary had its new Ikarus 55 luxury coach on show. This features integral construction of electrically-welded pressed-steel frame and body members. The rear-mounted 125 hp Diesel, fully accessible by a pair of full-width doors, is mounted on a sub-frame for easy removal. The engine compartment is said to be dust- and water-proof.

Another Hungarian bus is the Ikarus 60 of more conventional design. Intended for urban transport, this seats 22 passengers and is powered by the same six-cylinder engine as the Ikarus 55. Hungary's truck production is concentrated on the Csepel 350 using an 85 hp, four-cylinder Diesel.

Communist China showed up at Leipzig this year with a wide range of home-produced Diesel and gasoline engines. Largest was a six-cylinder marine unit rated at 300 hp at 600 rpm. Bore and stroke are 9.8 in. by 11.8 in., and compression ratio 15 to 1. Compressed air starting is used. Among the smaller units was a six-cylinder Diesel developing 60 hp at a governed speed of 1200 rpm. Glow-plugs in the turbulence chambers are provided for cold-weather starting. It was stated that engines of two and four cylinders with the same bore and stroke are being made.

China's adoption of Russian designs in engineering products made for the first time in that country is clearly widespread. For example, every one of the fifteen machine tools displayed in the Chinese exhibition hall bore a card indicating the Soviet type number it was based on. The same was true of heavy electrical equipment, coal-mining combines, and practically everything else that China was showing.

Rumania, too, is patterning new equipment after Russian models. At Leipzig it was displaying its own KD 35 tractor—its first crawler. According to Soviet specifications, this has a four-cylinder Diesel developing 37 hp at 1400 rpm. Another Rumanian exhibit was a six-cylinder 190 hp industrial Diesel engine.

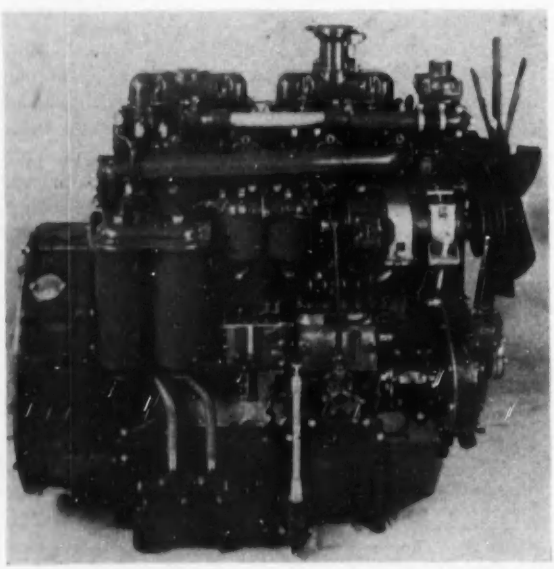
Only new vehicle in the Soviet hall was the GAZ 69 "jeep." This uses the 52 hp engine found in the Pobeda car with various modifications for extreme temperature running. The two forward-mounted radiators, one each for water and oil, may be blanked by a shuttter. The engine block is fitted with an electric immersion heater. Four by four drive is through a three-speed transmission and a two-speed auxiliary gearbox.

Double-deck bus of monocoque construction. Weight, empty, of this 64-passenger vehicle is 15,064 lb.

Increasing Applications of Small Diesel Engines Seen at Seventeenth International Show Held in Earls Court, London

Engineering Trends in

By W. F. Bradley
Special European Correspondent
for AUTOMOTIVE INDUSTRIES

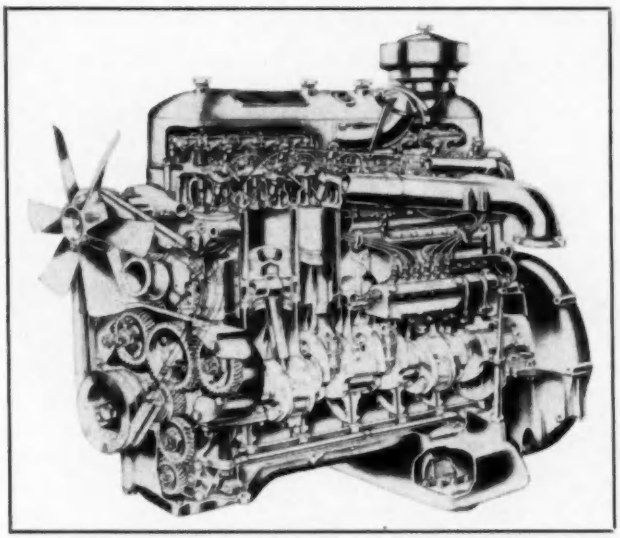


Rolls Royce C.4 SFL Model Diesel. This four-cylinder unit develops 167 hp at 2100 rpm.

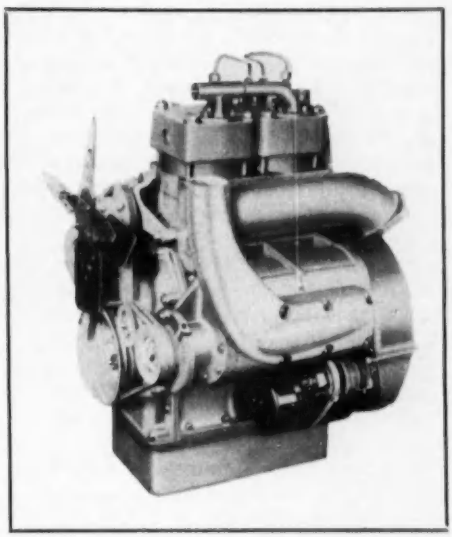
LONDON, ENGLAND

BRITAIN'S seventeenth international commercial vehicle show, held every two years at Earls Court, London, was almost entirely a national affair, with only one German and two French makes representing the foreign manufacturers. Some American names appeared above the booths—Ford, Dodge, Mack, Bedford (General Motors), etc., but these were considered as British by reason of the location of their factories. The nationl industry is a powerful one, with production running at the rate of 5000 vehicles per week, and in the first eight months of this year 87,000 vehicles were shipped overseas. This was 15,000 more than for the corresponding period of last year. Based on returns for the first eight months, a production of 247,000 vehicles, of which 130,000 will be exported, is expected for 1954. The value of exports for the first eight months of this year was 135 million dollars.

Although the show revealed no startlingly new de-



Cutaway view of the six-cylinder A.E.C. 125-hp Diesel.

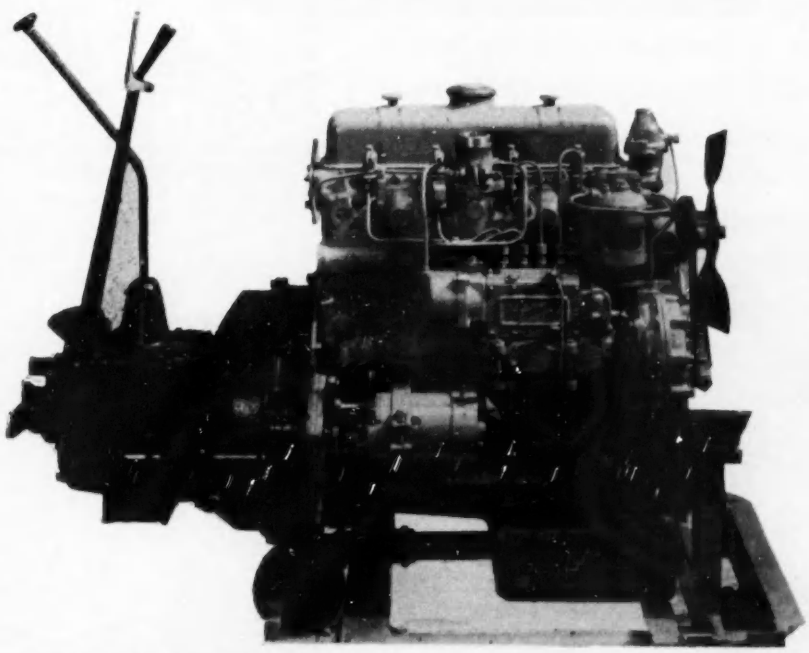


Smallest Diesel in the show, the two-stroke Turner.

velopments, there were some well defined tendencies. Among these was the desire for economy which has led to a very considerable increase in the use of Diesels, and an extended number of oil engines of small piston displacement. Under this heading is the attempt to reduce weight, more by the use of light alloys than by changes in design. The underfloor engine has gained enormously, while the rear-mounted engine has not advanced. There is a growing tendency to use more than four speeds in the transmission, five being general and six used occasionally. This must be attributed to export requirements, for four speeds are generally sufficient for home use. There are no automatic transmissions, for economy considerations rule these out. However, there is a strong move toward simplified driving, particularly for buses and coaches, by two-pedal control. Disk brakes have made no progress, the only firm using these is an operator assembling his own vehicles. The two-stroke Diesel is growing in popularity. In the high powers there is use, for practically the first time, of exhaust-operated blowers, and in some cases of displacement type blowers.

The move towards small Diesels is more economical than technical. With a national tax on gasoline equivalent to 35 cents per imperial gallon, the oil engine finds more and more

British Commercial Vehicles



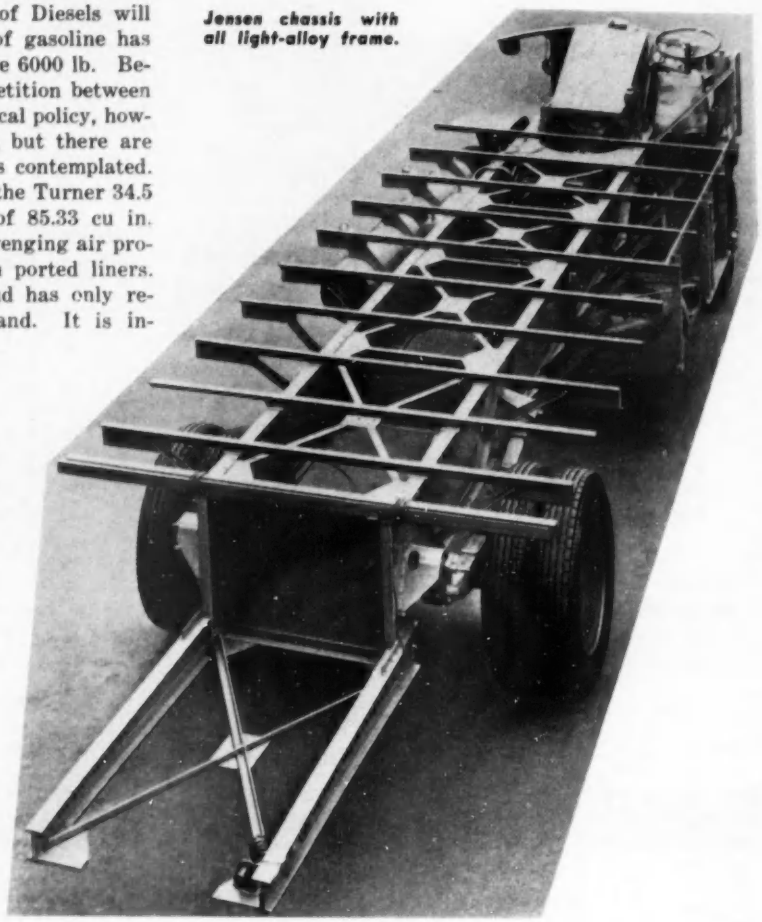
B.M.C. small Diesel used by Austin and Morris. It develops 58 hp at 2400 rpm.

favor. As purchase price is lowered, and this seems possible in view of the promised reductions in the price of injection equipment, the use of Diesels will expand. Speaking generally, the use of gasoline has been ruled out for all useful loads above 6000 lb. Below this figure there is still some competition between gasoline and heavy oil. A change in fiscal policy, however, would upset the entire situation, but there are no indications that any such change is contemplated.

The smallest Diesel in production is the Turner 34.5 hp vertical two cylinder, two-stroke of 85.33 cu in. displacement, with combustion and scavenging air provided by a Roots-type blower through ported liners. This engine is of Austrian design and has only recently gone into production in England. It is intended to produce it as front-drive unit and first move in this direction was on a Whitson 12-passenger bus. In this layout the four-speed David Brown gear box is behind the engine and there is a transfer to a fore and aft propeller shaft carrying the power forward to a conventional type hypoid-drive axle.

Most important in the move towards small Diesels is the appearance of

(*Turn to page* 110, *please*)



Jensen chassis with all light-alloy frame.

British Commercial Vehicles

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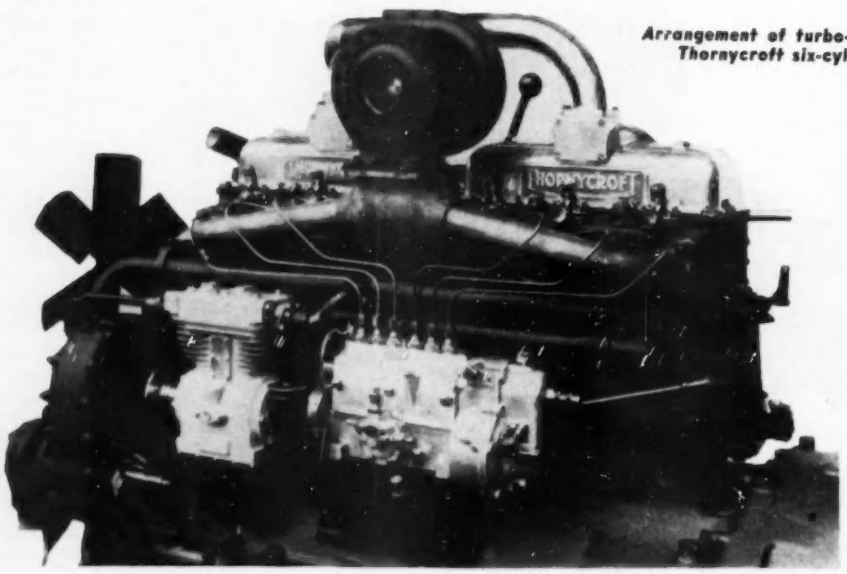

Arrangement of turbo-supercharger on Thornycroft six-cylinder Diesel.

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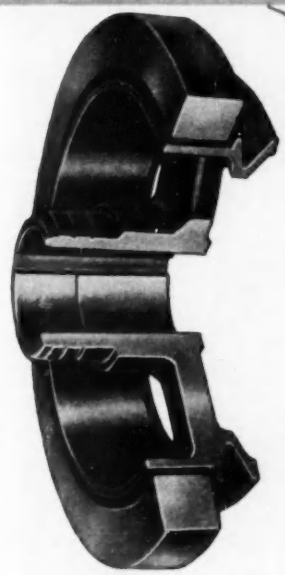

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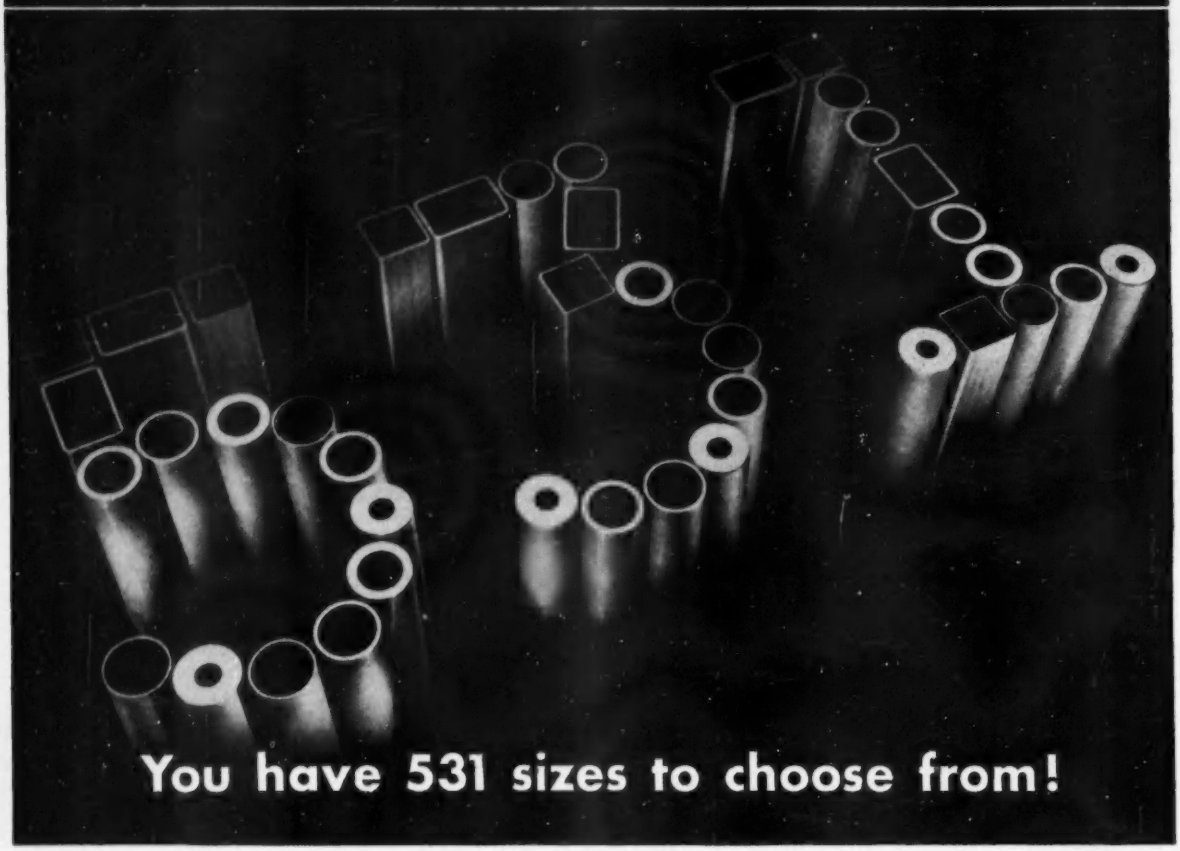

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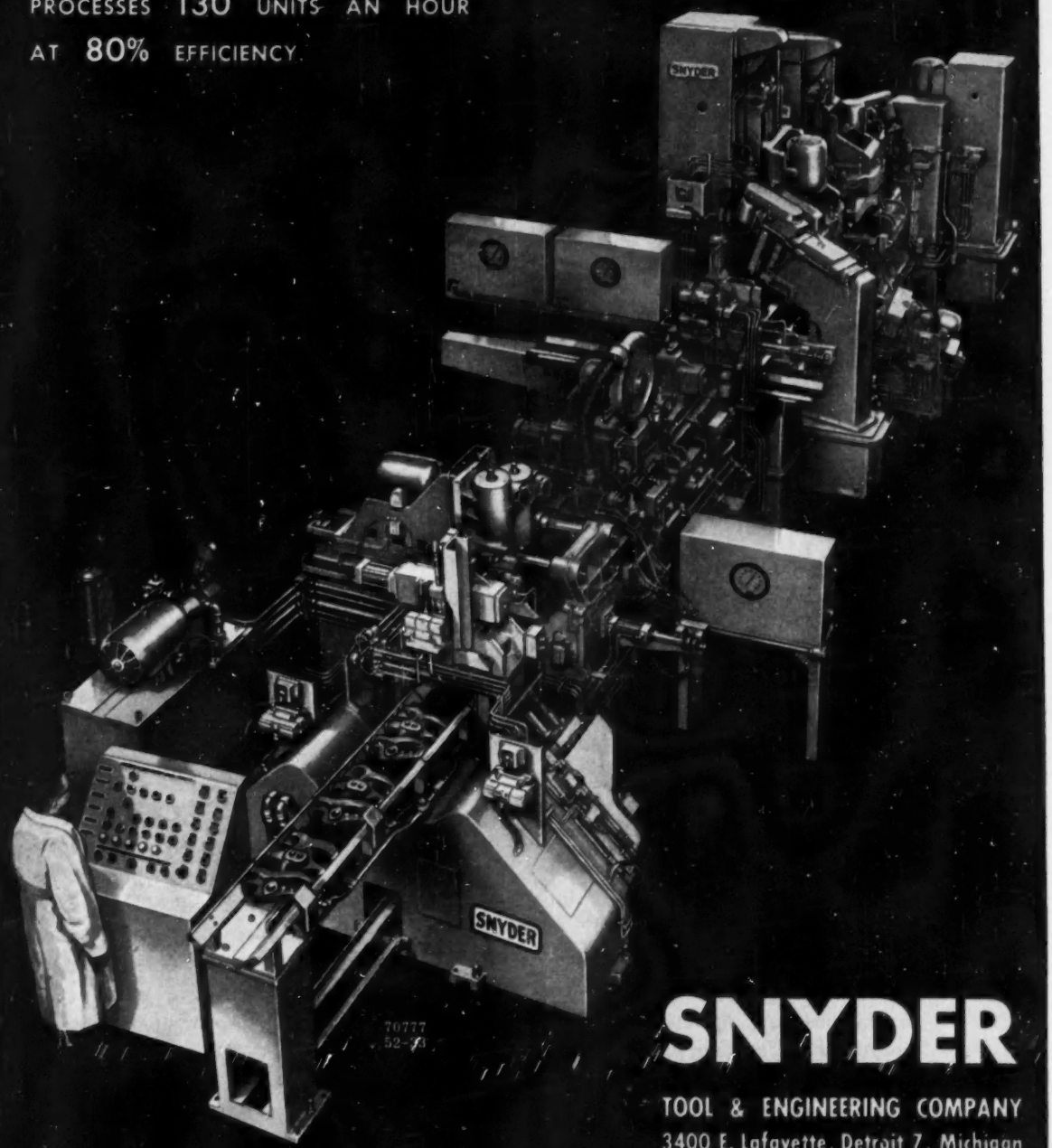

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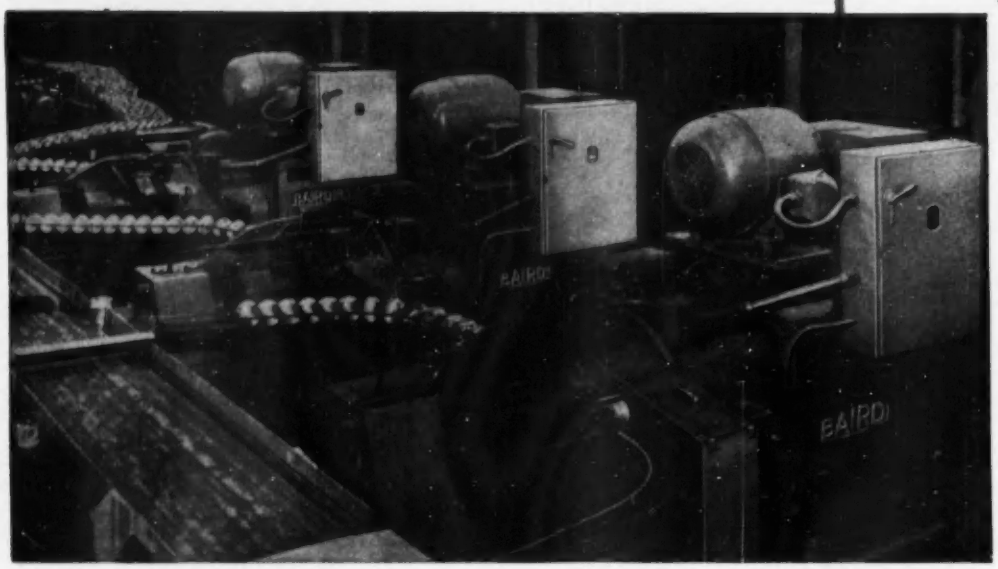

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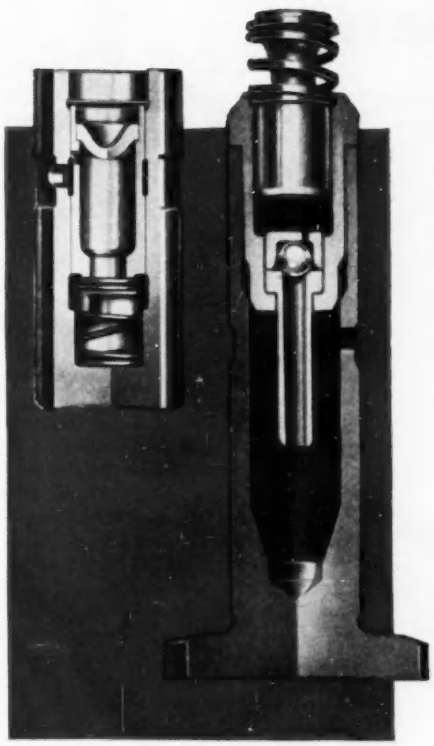

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News of the MACHINERY INDUSTRIES

By Thomas Mac New

Advantages of Statistical Quality Control Demonstrated in World's Largest Screw Machine Operation. AGMA Reports Increased Gear Production

Screw Machine Quality Control

At the ninth annual Michigan forum held recently in Ann Arbor, Mich., Glen S. Goodman, Division Head, Production Quality Control, McQuay-Norris Manufacturing Co., St. Louis, Mo., presented an interesting paper concerning the application of statistical quality control to automatic screw machine production. The quality control procedures have been applied to the Core Div. of the company, which is producing .30 and .50 caliber armor piercing bullet cores for the Government. Mr. Goodman states that this plant contains the largest automatic screw machine operation in the world.

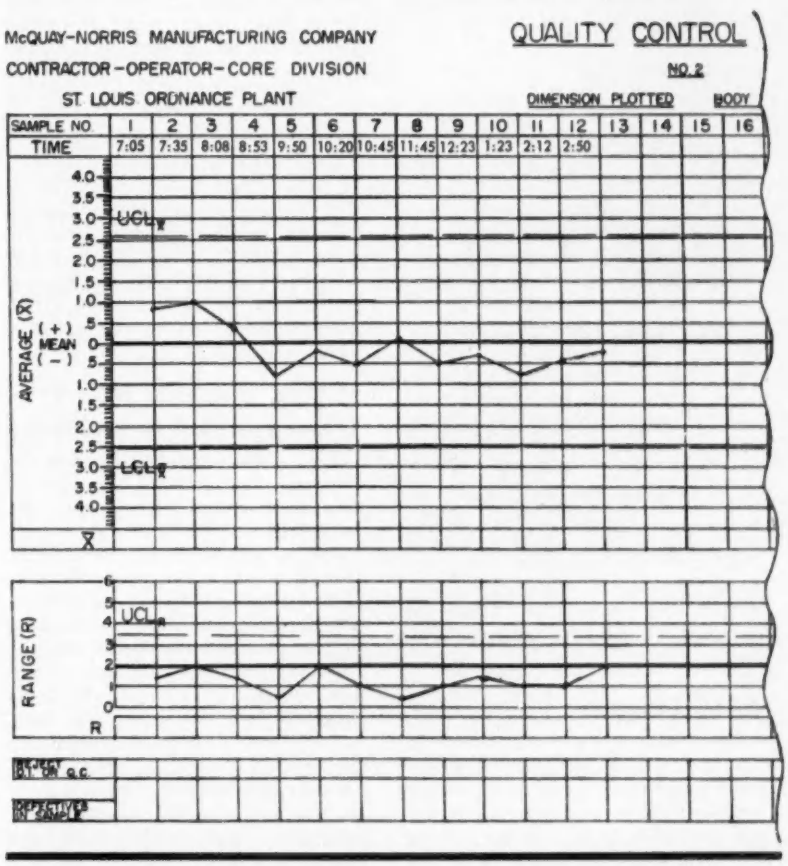
In a period of less than two years, the quality control program established by Mr. Goodman was able to accomplish the following: (1) Production rejections have been reduced from 25 per cent to 1 3/10 per cent, a reduction of 95 per cent. (2) Scrap losses have been reduced from 8.5 per cent, down to 0.86 per cent, a reduction of 90 per cent. (3) Ordnance rejection inspections have been reduced from 3.5 per cent to less than 0.1 per cent, a reduction of 97 per cent. (4) Inspection costs have been reduced more than 75 per cent. (5) The average product per machine has been greatly increased. Since this information is restricted, however, Mr. Goodman could not give a comparison.

In summarizing his paper, Mr. Goodman gave six essentials of a quality control program for automatic screw machine production. The first of these is to conduct extensive machine capability tests and then with the knowledge gained from these tests, analyze specifications. Next, try to use modified control limits. The fourth item is to consider a schedule of tool changes at regular intervals. For the next step, it should be determined whether or not p charts—per cent defective—will provide control of visual defectives. Finally, Mr. Goodman suggests that the heart of the quality program, the X (average or mean) and R (range) charts should not be underemphasized. As a matter of interest, machine capability tests conducted by Mr. Goodman proved that it was more economical to change tools at the beginning of each shift rather than to attempt to attain a maximum period of use.

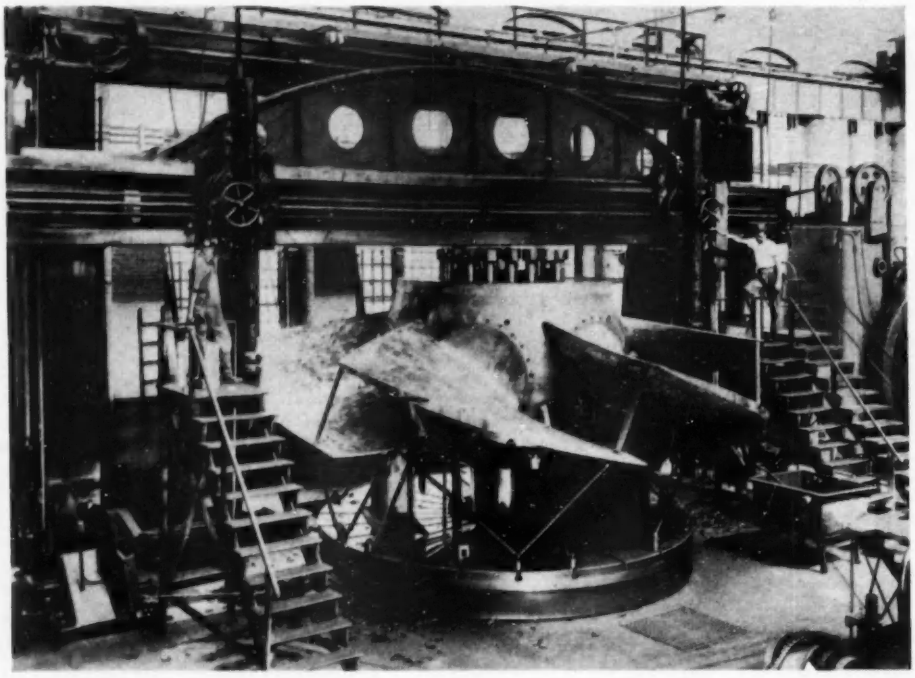
Press Glossary

The interchangeability of dies and fixtures between hydraulic and mechanical presses moved a step nearer realization with the announcement by the National Machine Tool Builders' Association of the completion by the Engineering Standard Committee of the Hydraulic Press section of the Association of a glossary of engineering terms for hydraulic presses.

The first of five studies on problems of standardization, the report will shortly be followed by others on metal-working presses (other than vertical open gap), on vertical open gap presses, on compression and plunger molding presses, and on accumulators, according to John M. Dolan, chairman



Statistical quality control chart for the mean and range of bullet core production by McQuay-Norris.



This machining setup for the cast steel propeller runner of a hydraulic turbine shows the 165-ton workpiece being machined with the turntable moving at 2.1 rpm. By the application of Carboloy 370 carbide, the S. Morgan Smith Co., York, Pa., reports that machining on the blade tip contour was cut from 220 hr to 65 hr. The cut is made 1/32 in. feed at an average depth of 7/16 in. and a maximum depth of 5/8 in. Since the runner is 23 ft, 3 in. in diameter, it has a surface speed of 154 sfpm.

of a three-man steering committee of the Hydraulic Press group which has had general supervision of the whole project. Dolan is vice-president and general sales manager of the Hydraulic Press Manufacturing Co. Other members of his committee are L. Crawford Beatty, president, Beatty Machine & Manufacturing Co., and Chas. S. Davis, Jr., vice-president, Lake Erie Engineering Corp.

This first report—on a glossary of engineering terms—is the work of a 21-man subcommittee, representative of as many manufacturers of hydraulic presses. Under the chairmanship of Harry L. Reynolds, vice-president of the Verson Allsteel Press Co., the committee has devoted some three years to preparation of the glossary which covers all types of hydraulic and compression molding presses, frame elements, cylinders, press control systems and components, pumps and controls. In addition, several pages each have been given to accumulators, hydraulic valves and fluid media. The association should be contacted for copies of the press glossary.

ASTE Project

The Research Fund Committee of the American Society of Tool Engineers has recently let its first research contract. This contract was placed with Columbia University for a study into the distribution of heat generated during the cutting of metal. This investigation shows promise of leading to practical results that can be immediately applied. It will attempt to fill in some of the blanks in metal-cutting technology and lead to more realistic specification of tool forms, cutting angles, and speed, feed and depth of cuts.

The Columbia heat and mass flow analyzer (an analogue computer) will be applied during this investigation because of the ease with which the effects of individual variables can be studied. Use of the analyzer was suggested by its successful application in determining core temperatures during casting and plotting heat flow during quenching.

Milling Machine Maker Observes 70th Anniversary

The Cincinnati Milling Machine Co., Cincinnati, is currently observing its 70th Anniversary, with specially arranged tours for customers, technical societies, and industrial groups, extending to late in the year. Featured in the special events are new plants, new products, and new ideas and ways to lower machine tool users' costs.

At a preview last month greetings were extended by Mr. F. V. Geier, president, before touring the Engineering and Headquarters Building, Main Plant, Heavy Machining Plant, Foundry, Products Division and Process Machinery Division. Since a complete trip through these plants is quite extensive, a goodly part of the tour was covered in small motor-powered trains. Of unusual interest was the reproduction of the company's original shop as it appeared in 1884, with original Cincinnati machines actually built during that period.

Another highlight of the tour was a trip through the company's Technical Training Center, including shops, class rooms, interview rooms, an auditorium, and the Fred A. Geier (Founder's Memorial Room). The Training Center and its facilities are completely new, and provide a large increase in area for the twenty-one courses of training now being given.

New products unveiled included a new line of heavy duty HyPowermatic milling machines, a new Toolmaster milling machine, a new No. 2 centerless grinder, a new No. 0 centerless grinder, and a new No. 1 cutter and tool grinder. Details of these new machines will be covered in AUTOMOTIVE INDUSTRIES at a later date.

Two novel presentations, including a new movie, "William Johnson and the Draggin," were interspersed with the more technical events during the preview day. The movie is a new, animated, different approach to problems of machine tool replacement.

Golden Anniversary

This fall, The Motch & Merryweather Machinery Co., Cleveland, is celebrating 50 years of service to industry. The firm, headed by E. Franklin Motch, has published a brochure which completely describes the products and services available to industry after 50 years in business.

NEW EQUIPMENT PLANT • PRODUCTION

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 89

Faster Shielded-Arc Welding for Mild Steel

FIELD tests on a consumable electrode, inert-gas arc welding process just revealed disclose a 15 to 20 per cent faster welding speed at a 25 to 50 per cent reduction in costs over other manual and semi-automatic inert gas methods.

Key to the new process, which uses ordinary welding grade argon to shield the arc, is West-ing-arc MS-20 coated wire. This wire produces best results when used with a newly designed welding gun, wire control, and constant potential power source—the RCP 500-amp d-c arc welder.

This process is said to bring the advantages of speed, higher quality and cleaner welds to the welding of mild steel. It produces welds that can be painted without cleaning. There is virtually no spraying or spatter, nor any slag-convering on the weld according to the manufacturers. The new process may be used on mild steels, with or without normal mill scale, on thicknesses from 1/16 in. up. It can be used as either a semi-automatic or automatic process. Primarily intended for horizontal and flat position welding, it is not yet developed for vertical or overhead welding.

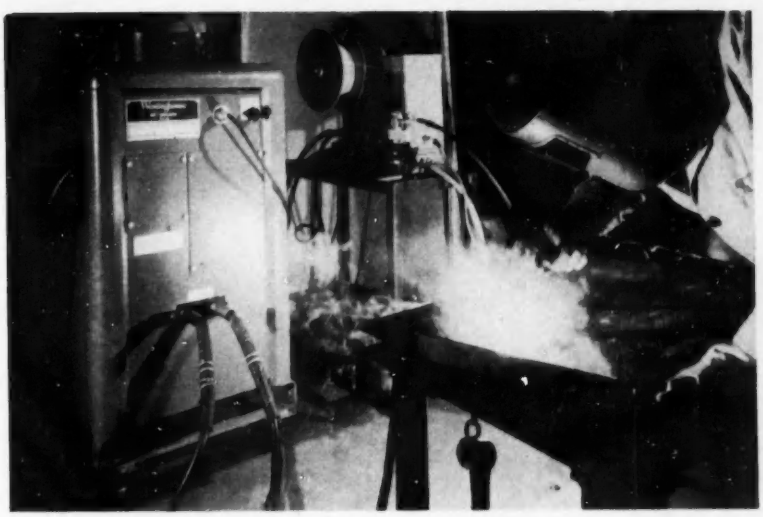
Physical properties of the welds are said to be superior to those obtained using either automatic or manual coated-electrode processes. Typical values at 80F include yield point, 63,-200 psi; tensile strength, 76,000 psi; elongation, 27.9 per cent of two in.; reduction in area, 69.4 per cent; impact by V-notch Charpy test, 100.

The new process uses straight polarity. The special coating on the MS-20 wire makes it possible to take advantage of some of the higher burn-off rates because it stabilizes the arc, eliminates spatter, and provides good penetration.

This process uses shielding gas at about 30 cu ft an hour, for a savings on gas of about 33 per cent over other inert-gas processes. While inert gas cost is not a problem in manual welding, and the type of electrode used is less costly than that used in semi-automatic welding processes, the characteristics of the West-ing-arc process are said to be so economical that it still results in about 25 per cent less cost per inch of metal deposited over manual methods. This cost includes: time for welding, cost of materials, and time normally required for cleaning and grinding preparatory to painting.

There are definite types of applications where this process is expected to replace submerged arc welding. It is not expected that the new process will be applicable to present high-current submerged arc welding applications above 500 amp.

The electrode gun, rated at 500 amp, is light in weight and well balanced. No tubing is exposed on the gun, which delivers wire, power, gas, and water. The tip of the gun is specially designed for high water-cooling efficiency. The control for feeding the wire has been designed to supply wire at a constant pre-selected speed under all loads. Both of the drive rolls are driven through a 1/12-hp d-c gearmotor. The electrode length beyond the tip of the gun is controlled on stopping so that neither wire nor operator time is wasted by trimming. An adjustable water pressure switch prevents operation of the unit when the water pressure is below a predetermined limit.



Components of the new West-ing-arc process are all newly designed—wire, welder, gun, and control.

The constant potential power supply is rated 220/440-v, 60 cycle, three phase. Its continuous current rating is 500 amp at 34-v load. The drop from no load to full load is only six volts. It may be used with either consumable electrode, inert gas metal arc, or submerged arc welding process. No current adjustments are necessary at the welder since it is automatically regulated by the rate the wire is fed into the arc. *Westinghouse Electric Corp.*

Circle 56 on postcard for more data

NEW EQUIPMENT PLANT · PRODUCTION

For additional information, please use postage-free reply card on page 89

Versatile Single Spindle Automatic

Open front, high wall cabinet of the Screwmatic 750 for maximum tool accessibility, effective oil splash protection, and visibility of the lead cam and tool setup. Open end chip well can be emptied during operation.

CALLED the Screwmatic 750, a unit designed single-spindle automatic screw machine has incorporated an infinitely variable spindle speed drive. On the standard model, this permits a maximum spindle speed of 5100 rpm with higher speeds available on request. This permits a choice of three different spindle speeds during any work cycle, controlled by a dial setting and adjustable during actual cutting. Reversibility of all forward speeds is accomplished by air pressure.

An independently supported V-belt sheave drives the spindle by means of a clearance spline. Greater forming precision is assured because the standard, anti-friction spindle bearings carry cutting tool pressures only. The spindle proper carries no drag from drive members or clutch bodies.

Chatterproof forming is assured by heavy section cross slides guided on vertically arranged dovetails. Slide unit is mounted upon deep wall supports. Slides are direct cam actuated with micrometer adjustment and concealed dead stops.

The six station turret is held in precision needle bearings and locked in hardened taper bushings. Realignment is provided for through a subbase slide guide. The machine accommodates standard turret tools of 0.750-in. diameter.

Stock feeding is through low pressure air cylinders. Using standard size collets and feeders, this new screw machine takes bar stock up to 0.750 in. in diameter. Stock lengths up to 2¼ in. are turned with a standard seven in. cam. But turning lengths up to six in. are obtainable with larger cams. This capacity is made possible through a turret slide unit which includes the lead cam and drive. The turret unit is mounted horizontally and slides along the machine base. When positioned away from the work spindle, turret tools will machine six-in. work pieces without requiring cam cut downs.

The turret slide proper is equipped with a three position crank setting and the turret index drive with three index speeds. Shorter work pieces are easily and economically accommodated by the readily adjustable turret slide and index stroke and speed. Cam shaft cycle speeds range from 1.8 to 240 seconds.

Simplified forms of the machine can be supplied for long run production of simple parts. It can be delivered without such features as variable spindle speeds and spindle reversal. A plain tool slide can be substituted for the turret slide. *Gear Grinding Machine Co.*

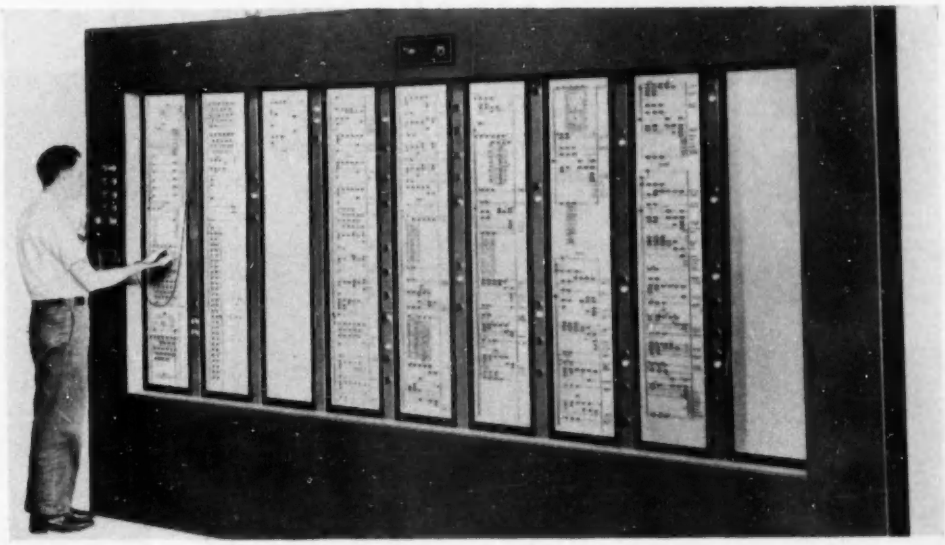
Circle 58 on postcard for more data

Quick-Change Valve Assemblies

Manually, mechanically and pilot actuated Hi-Cyclic air and hydraulic valves are now available in hand lever, fingertip or foot lever, piloted and cam roller actuators. These actuator assemblies are mounted to the valve body by means of a snap-on construction for interchangeability. (Beckett-Harcum Co.)

Circle 57 on postcard for more data

Custom-Built Detector System Eases Control Maintenance



Over-all view of a typical test panel, one of fifteen designed and built for the complex control system of a large automotive plating machine. Electrician uses built-in probe to test terminal check points on diagram while power remains on. Defects are pinpointed in a small area and repairs can be made quickly.

REVERSAL of the trend to greater loads on maintenance and plant operating engineers is the aim of the Electro-Graphic Detector System. The wired-in checking system consists of separate electrical circuits wired to schematic diagrams.

Terminal check points enable the operator to locate failures in the control system. Sequence-indicating lights also help to isolate the trouble. Each terminal represents a connection between two contacts in the electrical control. A grounded test probe inserted in the check point locates the defect. Power-on testing is one advantage of this system, since the maintenance electrician need not enter the control panels. The detector system is designed for use with unitized control systems of the step type. It can often be adapted to other types of control systems.

Standard illuminated panels are tailored to the control circuit. The diagrams are placed between sheets of transparent plastic, while lights are on the dividing strip. *W. F. & John Barnes Co.*

Circle 59 on postcard for more data

Motor Range Extended

RE-RATED Tri-Clad "55" polyphase induction motors are now available in quantity in ratings from one to five hp, it has been announced. NEMA frame sizes now available are 182, 184, 213, and 215.

All ratings are available in totally-enclosed models as well as the regular dripproof enclosure. Immediate delivery is also available on sample quantities in 7½ and 10 hp ratings. *General Electric Co.*

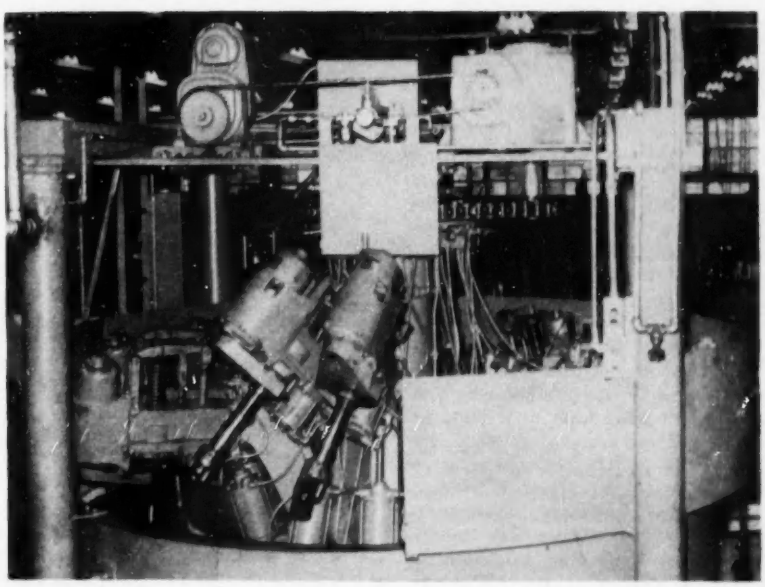
Circle 60 on postcard for more data

Slurry Type Surface Improver

A MULTIPLE-SPINDLE machine offers controlled high-speed directional flow of small abrasive. It is designed to debur, radius and surface-improve parts of metal or plastic. Low limit of precision is said to be 0.001 in.

Non-directional surface finish is provided by a bank of slowly-turning spindles, in a wet slurry tank rotating at higher speed. Spindles are preset at the best angle for the job. The spindles automatically rise at the unloading point and unclamp the part. From four to 14 spindles are available, with either a constant or variable abrasive tank speed. Spindles can index to one loading station, or be fixed for a walk-around operation. The machine is intended to replace hand finishing. *Mecha Finish Corp.*

Circle 61 on postcard for more data



The Mechamatic MM-14 machine for precision automatic deburring and finishing.

NEW EQUIPMENT — PLANT • PRODUCTION

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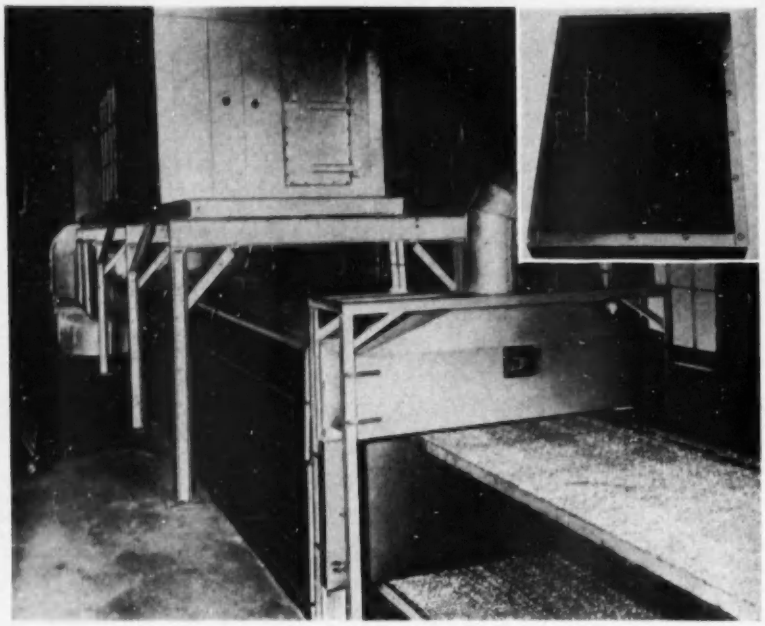
Catalytic Fume Control



Catalytic recovery unit with heat exchanger installed over electric oven for drying stain. Inset shows the usual form of a standard catalytic element.

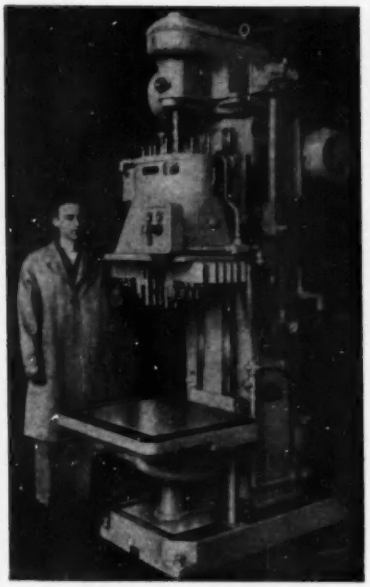
A CATALYTIC combustion system currently being exploited is claimed to reduce exhaust odors and pollutants in many industrial processes. In addition, the manufacturer says it recovers otherwise waste heat from the exhaust.

Several standard designs of such systems are coming into general use, the selection of a given system being dependent upon fume temperature, volume, and energy concentration. Possible objectives include recovery of sensible heat from exhaust gases. Another is conversion of latent fume-energy to heat and recovery with sensible heat to the oven or furnace from which the gases have been released, to adjacent heat-processing equipment, or to plant make-up air system. Others include reduction of total plant make-up air volume; control of a volatile liberating process; and improved safety of operation through elimination of duct condensate, stack fires, or cleaning shutdowns. *Catalytic Combustion Corp.*

Circle 62 on postcard for more data

Drilling Machine

MANUFACTURE of a high speed, push button controlled multi-drilling and tapping machine for medium sized work has been announced. It is available with a single spindle, adjustable spindle or a fixed center spindle head.



The Natco D225H drilling machine, shown with multiple spindle head, is offered with a variety of control cycle equipment available.

The push button control feature offers a standard cycle of rapid traverse forward, 1st or coarse feed forward, 2nd or fine feed forward, rapid reverse, stop. Additional equipment is available for a jump feed cycle of rapid traverse forward, 1st or coarse feed forward, rapid traverse forward, 1st or coarse feed forward, 2nd or fine feed forward, rapid reverse, stop. Time delay reverse cycle equipment also is offered for rapid traverse forward, 1st or coarse feed forward, 2nd or fine feed forward, dwell against positive stop for predetermined time, rapid reverse, stop. *National Automatic Tool Co.*

Circle 63 on postcard for more data

Air Dehydrator and Filter

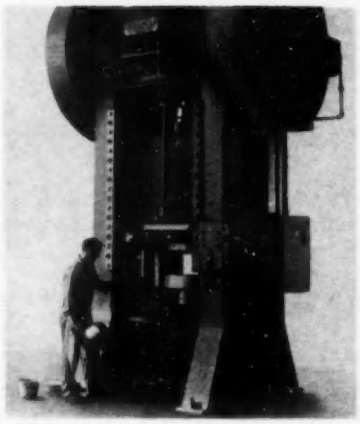
TWO models of the Condensifilter for dehydrating and filtering compressed air have been announced recently. They are models M-30 and M-100, rated at 30 and 100 scfm respectively, at line pressure of 100 psig. Both models feature a condenser to reduce compressed air dew points, plus a disposable filter cartridge for removing solid particles. The new prefabricated steel case has a spun elliptical head that permits operating pressures up to 200 psig. All sealing is with O rings.

In operation, compressed air enters the unit through the steel center shaft and passes into the spiral copper condensing section. The condenser reduces the temperature of the air to within two or three degrees of the cooling water temperature. The air then passes upward and through the cotton felt filter cartridge, reenters the center shaft, and returns to the system. Condensed vapors drop into the condensate collection chamber, and can be manually discharged or trapped to drain. *Hankison Corp.*

Circle 64 on postcard for more data

Deep-Draw Presses

PRESSES for high-production deep-draw work, to be known as Steelweld Hi-Draw Presses, are being announced. A newly developed linkage provides quick approach, quick return and slow constant drawing velocity.

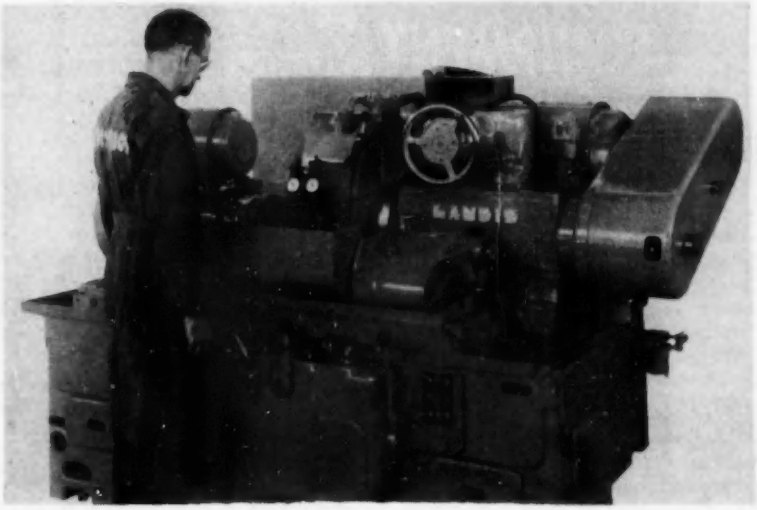


Single-point, single-action, 215-ton Steelweld Hi-Draw Press with die cushion. Parts shown being made require a seven-in. deep draw in one operation.

Press operating speeds are said to be up to 80 per cent greater in strokes per minute than for an equivalent crank press with the same stroke and yet provide the same drawing speed. The presses are available in single or double-action, one-, two-, or four-point types. Sizes range from 160 tons capacity and up. *Cleveland Crane & Engineering Co.*

Circle 65 on postcard for more data

Plain Cylindrical Grinder



Landis precision grinder for large wheels.

WIDE or large diameter wheels are features of a series of plain hydraulic precision cylindrical grinders now available. Wheels up to 10 in. wide for infeed grinding operations can be used. Spaced wheels for multiple diameter or profile grinding up to 10 in. from outside to outside of wheels can be used. Some work pieces requiring large diameter wheels for clearance of webs can be handled on this machine using 36-in. diameter wheels.

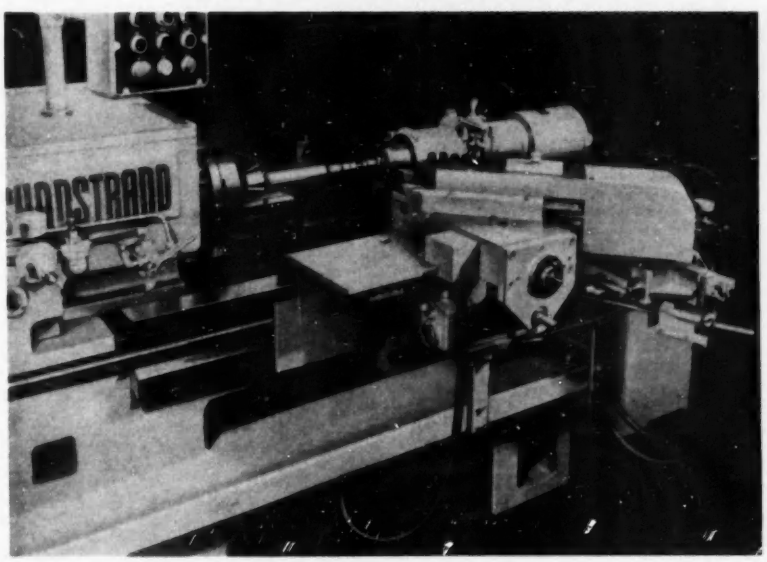
The 10-in. machine type DCH and the 14-in. type LDCH are both made in 18, 36, 48, 72, 96 and 120-in. lengths between centers.

A heavy duty wheel head and large spindle is used to support the grinding wheels. A single lever hydraulic wheel feed moves the grinding wheel into grinding position. A slow feed moves the wheel head, during grinding, to a predetermined stop position. After sparkout, the wheel head retracts rapidly. Hand feed with both coarse and fine adjustments is standard equipment. The grinding wheel is driven by a 25-hp motor. The work head is powered by a 1½-hp motor. The work table may be moved by either a two-speed hand traverse or hydraulic power. The speed of the hydraulic traverse is variable by dial control. Adjustable dwell is also provided. Microsphere bearings to support the wheel spindle permit alignment to the wheel spindle and adjustment for running clearance.

Vee and flat ways for the wheel head and carriage are pressure lubricated by filtered oil. A pressure switch interlock prevents operation of the machine unless pressure is maintained in the system at all times. *Landis Tool Co.*

Circle 67 on postcard for more data

Tracer for Automatic Lathes



For multi-cycle single point turning of irregular shapes, a line of automatic lathes can be provided with a template controlled tracing slide mounted to the regular front carriage. Ruff, semi-finish and finish cuts can be taken with one tool in one cycle. Only one template is required. The machine can be set up for one, two or three cycles. The regular cross feeding rear slide can be used to square up shoulders, chamfer, etc. This attachment is available for factory installation only. (Sundstrand Machine Tool Co.).

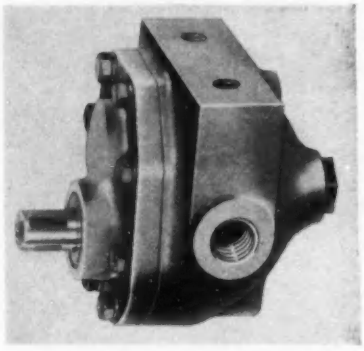
Circle 66 on postcard for more data

NEW EQUIPMENT PLANT • PRODUCTION

For additional information, please use postage-free reply card on page 89

Gear Pump

A high-pressure pump for heavy-duty hydraulic power applications with minimum weight and bulk, the Model No. 051002-110 incorporates new developments of the "pressure-loaded" principle. Designed for pressures up to 2000 psi and capacity of 11 gpm at 2400 rpm, it may be used continuously to 150 F. (Pesco Products Div., Borg-Warner)



Circle 68 on postcard for more data

Gas-Air Mixer

PRECISION gas-air mixing and carbureting is provided by the Mixor machine. It is supplied as a complete package with vane-type compressor, standard 1750 rpm motor drive through V-belt, motor adjusting base, air filter, pressure relief valve, gas zero governor, lubricator, carburetor and flow-meters all mounted and factory piped.

The carburetor is designed to be completely disassembled, cleaned and put back together in five minutes, without disturbing the ratio setting. A glass observation cap in the carburetor indicates when cleaning is necessary.

This unit may be used on gas generators of the endothermic and exothermic types. It is also useful for producing gas-air mixtures for flame hardening, torch brazing, torch annealing and soft metal melting. Made in three sizes, nominally rated for mixing capacity at 400, 600, and 1500 ft per hour, it is available for city gas, natural gas, propane, butane, and air. *Waukee Engineering Co.*

Circle 69 on postcard for more data

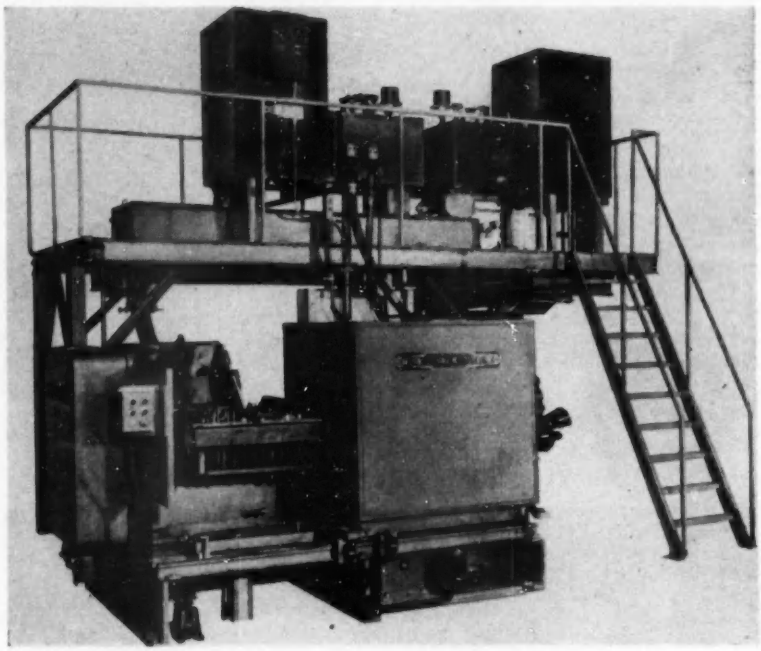
Motor Disk Brake

LATEST addition to a line of re-designed magnetic disc brakes, the model H-70 is for use on re-rated 3-20 hp motors. It is available in maximum torque ratings of 10, 15, 25, 35, 50, 70, 75 and 105 lb-ft. The brake is designed to mount on new frame sizes 213 through 286 and is up to 15/16-in. shorter than previous brakes.

A new feature of the H-70 brake is the manual release-automatic reset wear indicator recently introduced. The spring set solenoid released brake is supplied for either horizontal and vertical motor mounting or independent floor mounting and is available with either standard or dusttight, waterproof enclosure. *Stearns Magnetic, Inc.*

Circle 70 on postcard for more data

Automatic Shell Molder



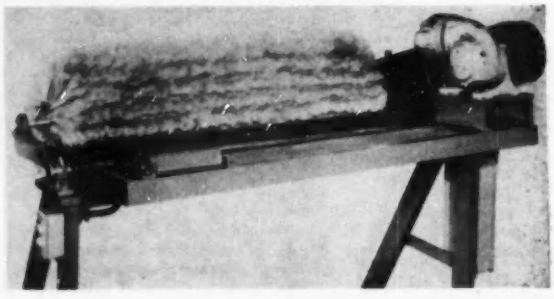
Automatic single-station shell molding machine capable of turning out forty 22 by 28 in. shells per hour, has been built for continuous high-production operation. It is electrically driven except for air operated dump box latch and stripper unit. Timing for pattern pre-heat, dwell time, and cure can be controlled from zero to 120 seconds. Refinements include elimination of springs in pattern assembly. A sand bridge in the investment box achieves a vertical-drop effect. Constant supply of mix in hopper assures compact high-density shells. All controls are in single case, and sand investment cycle is operated by single gear-driven mechanism. (Mechanical Handling Systems, Inc.)

Circle 71 on postcard for more data

Hood Washing Without Attendant

This automotive hood washing machine removes sludge from the top surface after wet sanding. Frame remains stationary, straddling the conveyor belt. The cylinder brush is counterweighted, rotating at 300 rpm. (Fuller Brush Co.)

Circle 72 on postcard for more data



Nickel Process

An improved barrel nickel plating process for fully-bright ductile white deposits that have low stress, is also said to offer stability of plating solution over long periods, and deposits that require no activation prior to chromium plating. It is called Nickel-Lume barrel plating, and is an adaptation of the standard Nickel-Lume bright nickel bath to barrel electroplating.

Continuous filtration is not required, and bath purification is usually unnecessary. Temperature range permissible is 75F to 120F without any loss of brightness. Voltage range is eight to ten. Rate of deposition is up to about 0.0002 in. in 30 min, depending upon the particular installation. Ventilation is not required. The pH runs between 3.5 and 4.2 (electrometric). *Hanson-Van Winkle-Munning Co.*

Circle 73 on postcard for more data

Cutting Fluid for Bronze

Bronz-Cut No. 10, a bland creamy white liquid, has been developed for the machining and tapping of all bronzes and similar tough anti-friction metals and hard aluminum. It has great surface tension which causes it to cling to the tools and to the work. *Prim Products Co.*

Circle 74 on postcard for more data

Buffing Compound

Learok Tripoli TP42X is a fast cutting, clean working Tripoli composition for buffing all non-ferrous metals. This new composition is formulated to give extra bar strength for automatic buffing with mechanical applicators. Strength of bar is said not to be affected by elevated temperatures commonly met with in summer months. *The LEA Manufacturing Co.*

Circle 75 on postcard for more data

Grinding Segment Adhesive

Grinding segments can now be reclaimed using an adhesive recently developed. Called Gaff Bond 334, it is applied to the surface of the stones. The segments are clamped together with two C clamps for 48 hours, and then returned to the grinder for reuse. No heat or pressure is required. The process can be continued indefinitely with no segment loss according to the maker, *Chemical Development Corp.*

Circle 76 on postcard for more data

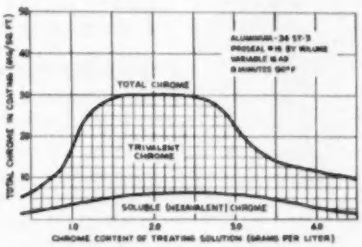
Smooth Finish for Plastics

A new process is said to eliminate traditional tell-tale mat prints from finished products press molded of reinforced plastics. Finish No. 107, as the procedure is called, is claimed to do away with buffing, sanding and painting in press molding manufacture. Color pigments, impregnated in the operation itself, are spread evenly throughout the finished product, which evolves with a smooth, glossy metallic-like finish. *Lunn Laminates, Inc.*

Circle 77 on postcard for more data

Surface Treatment for Aluminum

Proseal No. 16, chromate conversion protective coating for aluminum and aluminum alloys, has been announced. Said to inhibit corrosive action between paint and aluminum, the film meets requirements specified in MIL-C-5541 for military aircraft applications and, according to the manufacturer, is designed for use on any application where extruded, forged, wrought or cast aluminum and its alloys are used.



Tests indicate that no changes in physical properties have been noted on panels treated with Proseal No. 16 after 500 hr of exposure to 20 per cent salt spray solution at 95F. Relative ratio of the chromate films, as shown on the chart, are maintained at about 5 to 1.

Advantages claimed include greater control over uniformity of film; low material cost; suitability for production coating of any aluminum component. *Promat Div., Poor & Co.*

Circle 78 on postcard for more data

Pre-Coated Metals

Pre-coated coils of aluminum or steel, called Coil-Cote, are now available in a choice of color or finish. The material reportedly can be formed, bent, drawn, pierced, and fabricated without cracking, peeling, or crazing. In forming dies, its coating is said to act as a lubricant. *Andwall Manufacturing Co.*

Circle 79 on postcard for more data

Cold Cleaners

To replace highly volatile solvent cleaners in still tanks on the production line, a combination "cold" cleaner is offered to eliminate the fire hazard.

Advantages claimed for this room temperature, water-emulsion cleaning combination of Houghto-Clean 402-403 are: thorough removal of most generally encountered shop soil; protection of freshly cleaned surfaces from rusting between operations or in temporary indoor storage; elimination of heating system costs; and improved working conditions by the elimination of steamy, uncomfortable atmospheric conditions associated with hot alkaline cleaning methods. *E. F. Houghton & Co.*

Circle 80 on postcard for more data

Electrocleaner

Recommended for use on steel and copper, K-8 heavy duty electrocleaner is claimed to provide excellent detergency properties to remove mill oil and smut from steel prior to electroplating. It is a granular, anhydrous product containing 100 per cent active ingredients which resist neutralization by acid soils and provides excellent electrical conductivity. K-8 is resistant to the effects of hard water and is free rinsing. It is recommended for use at four to 12 oz/gal. at 210 F with 75-100 amp per sq ft to take free advantage of K-8's high conductivity. Cleaning time will vary from ½ to two minutes depending on the applications. *Metal Processing Department, Pennsylvania Salt Manufacturing Co.*

Circle 81 on postcard for more data

Bag Molding Seal

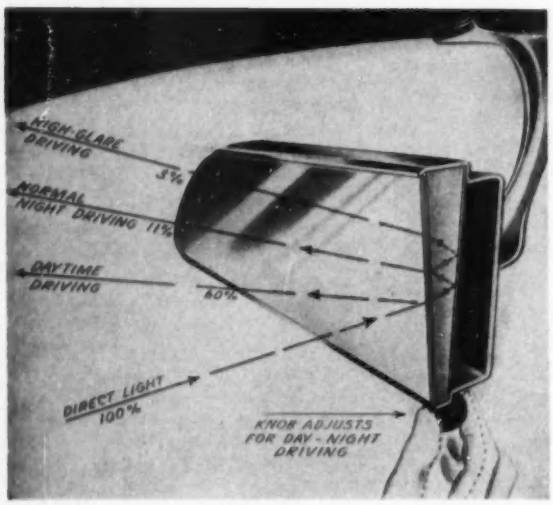
More efficient and economical molding of polyester glass fiber laminates is said to be possible with a versatile sealing tape recently developed. The tape, known as No. 579.6 Polyvinyl Film Sealer, is designed as a replacement for metal forms, gaskets, rings and C clamps in hermetically sealing the polyvinyl alcohol blanket or bag in vacuum bag molding of polyester glass fiber laminates.

Developed especially for the aircraft and plastics industry, the extruded sealer has been used for various purposes such as to seal a Plexiglas inspection window to the body of guided missile castings. The light green, odorless sealer reportedly is permanently soft, will not flow at 300 F. and is non-staining, non-bleeding and non-toxic. *Presstite Engineering Co.*

Circle 82 on postcard for more data

NEW PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 89

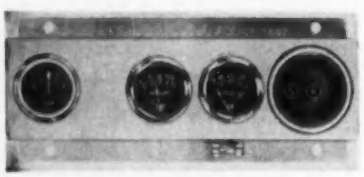


Three Way Mirror

Reduced glare day and night is the objective of a mirror that splits light in three ways. The shifting lever changes the mirror angle and determines whether the driver sees a reflection from the front surface, or from the back surface after filtering through the front. The mirror is wedge-shaped, and coated on the front with three films similar to that of military optical devices. The back is mirrored with a glare-resistant metal. The front surface "beam splitter" coatings of non-metallic oxides have a lower index of refraction than the glass used, and re-direct certain wavelengths through the lens.

For daylight driving, the mirror reflects about 60 per cent of the total light, mostly in the yellow-green range. For normal night driving, the mirror reflects a yellow-reddish image using 11 per cent of the light. For high-beam night driving, it reflects three per cent of the light with a lighter red image. *Liberty Mirror Div., Libby-Owens-Ford Glass Co.*

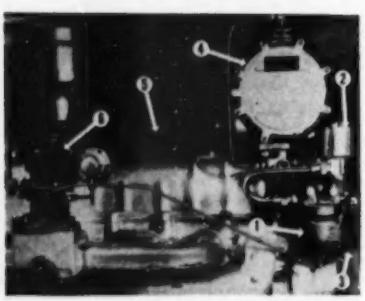
Circle 36 on postcard for more data



Instrument Panel for Stationary Engines

A safety panel designed to protect unattended engines from burned bearings, frozen pistons or other failures has been introduced. The panel for engines with battery ignition consists of oil pressure and water temperature gages in combination with an engine shut-off switch; an ammeter; stop switch and re-set and 14-amp fuse. The point for automatic shutdown is preset. *Stewart-Warner Corp.*

Circle 37 on postcard for more data



LPG Fuel Systems for Cars, Trucks

Liquefied petroleum fuel systems now available for tractors, trucks and taxicabs feature a unique fuel metering control. The first regular production units will be for installation on Chevrolets, GMC trucks, International Harvester trucks, and Plymouths. The units are described as providing extra fuel for pulling and full load operation, but the flow of fuel is stopped automatically when the load lightens so that best economy is obtained through part-throttle, or intermediate, speed range. Parts of the system as pictured are: 1, fuel filter; 2, electric lock off; 3, vaporizing housing; 4, regulator; 5, vapor hose; and 6, carburetor and fuel control. Tests by fleet operators are said to have shown ease of service, and low carbon reposits. *Zenith Div., Bendix Aviation Corp.*

Circle 38 on postcard for more data

Anti-Fowling Spark Plug Design

The 1955 line of AC spark plugs for all passenger cars will feature a "hot tip" insulator. It is described as a recessed insulator tip of extreme hardness and thinness, with a maximum amount of turbulent area between the insulator and shell. This is claimed to resist deposits over the entire range of low and high speed driving. Other patented features are copper-glass seal and heat-sealed construction. *AC Spark Plug Div., General Motors Corp.*

Circle 39 on postcard for more data

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Postage-Free Postcards Are Provided Here for Your Convenience to Obtain FREE LITERATURE and Additional Information on NEW PRODUCTION AND PLANT EQUIPMENT, AND NEW PRODUCTS Described in This Issue of AUTOMOTIVE INDUSTRIES. Please Circle Code Numbers of Items in Which You Are Interested, Print Name, etc., and Mail Promptly for Quicker Service.

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FREE LITERATURE

Air Actuated Bar Folder 1

Bulletin 74-B presents an air actuated adjustable bar folder, along with a complete line of hand and foot operated folders and brakes. *Niagara Machine & Tool Works.*

Investment Castings 2

A pictorial story of lost wax casting facilities available, together with some design information, is available in a booklet from *Cadmet Corp.*

Cutting Tools 3

A handbook size 126-page catalog of reamers, end mills, special tools, milling cutters, etc., is offered by *Falcon Tool Co.*

Burners 4

A catalog on Series CF closed flame gas-oil burners was recently published by *Eclipse Fuel Engineering Co.*

Finishing Ovens 5

Finishing systems for baking and drying all types of industrial equipment, including six case histories showing how various manufacturers solved their finishing problems, are discussed in an eight-page brochure now ready. *Michigan Oven Co.*

Grinding Wheels 6

A new condensed catalog of the most widely used grinding wheels carried in stock has just been published, including a supplement of net prices to the customer in various quantity lots. *Norton Co.*

Damping Guide 7

An eight-page design guide explains how vibration damping units can be designed and manufactured for specific applications, from refrigeration equipment to giant punch presses. *The General Tire & Rubber Co., Industrial Products Div.*

Steel Forgings 8

A 16-page brochure on steel forgings shows facilities, quality control, and case histories. *Amforge Div., American Brake Shoe Co.*

Cutting Guide

Prepared for engineers, methods departments and lathe operators as a guide to establishing proper cutting speeds and feeds, a 36-page booklet replete with technical information can be obtained by writing on company letterhead to *Monarch Machine Tool Co., Sidney, Ohio.*

(Please turn page)

VOID After Jan. 1, 1955 **11/1/54**

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Casting Terms 9

Glossary of Terms for Producers and Users of Iron Castings—36 pages—explains over 150 technical terms that are used in common between suppliers and users of ferrous and nonferrous castings. *International Nickel Co.*

Air Gages 10

A 30-page catalog and price list on Precisionaire air gages, tooling, and accessories is available from *The Sheffield Corp.*

Chipless Machining 11

The Roto-Flo so-called chipless machining process for cold-forming splines, serrations, and similar forms is presented in a four-page bulletin, RF-54. *Michigan Tool Co.*

Blast Barrels 12

Various models of Continuous-Flo Rotoblast barrels available for production line blast cleaning to reduce cleaning costs are covered in bulletin 226. *Pangborn Corp.*

Industrial Products 13

Its first complete catalog, with emphasis on industrial products, a 48-page book illustrates representative parts produced by eleven divisions of the *American Brake Shoe Co.*

Transmission Costs 14

Details of how power transmission costs may be cut by using standard Cone-Drive reducers, gearsets and components are available in bulletin 789-54, from *Cone-Drive Gears Div. of Michigan Tool Co.*

USE THIS POSTCARD

Extruded Shapes 15

Literature describing the new hot extruded shapes it is offering in stainless, tool steels, high temperature alloys, and other steels, is available from *Allegheny Ludlum Steel Corp.*

Resins 16

Four resins—Zytel nylon, Lucite acrylic, Alathon polyethylene, and Teflon tetrafluoroethylene—for automotive uses are pictured and described and engineering properties are fully listed in brochure A-7591 by the *Polychemicals Dept., Du Pont.*

Stock Forgings 17

Stock industrial and automotive forgings are illustrated and described in 40-page catalog 19A recently published by *Cleveland Hardware and Forging Co.*

High Capacity Gearing 18

A quick picture of the product design improvement opportunities said to be offered by using so-called Duti-Rated Lifetime Gearing is presented in bulletin DRB by *Foote Bros. Gear and Machine Corp.*

Hydraulics Components 19

Motors, gear-type pumps, valves, cylinders and valve and pump combinations for up to 1000 psi working pressure are presented in a catalog offered by *Wisconsin Hydraulics, Inc.*

Diamond Wheels 20

Catalog No. 1233, 52 pages, containing a comprehensive assortment of standard sizes of diamond grinding wheels and hones, including price lists, has just been published by *Norton Co.*

Rubber and Plastics 21

A 16-page brochure describing the design-development-production package program offered by the five plants of the Industrial Products Div. deals with molded and extruded rubber; extruded plastics; rubber-to-metal bonded parts; vibration and shock control units; and plastics-reinforced fiber glass parts. *General Tire & Rubber Co.*

Conveyor Units 22

An attractive two-color brochure pictures and briefly describes how 27 material handling problems were solved with mechanized units, individually designed and built from standard components. *W. F. & John Barnes Co.*

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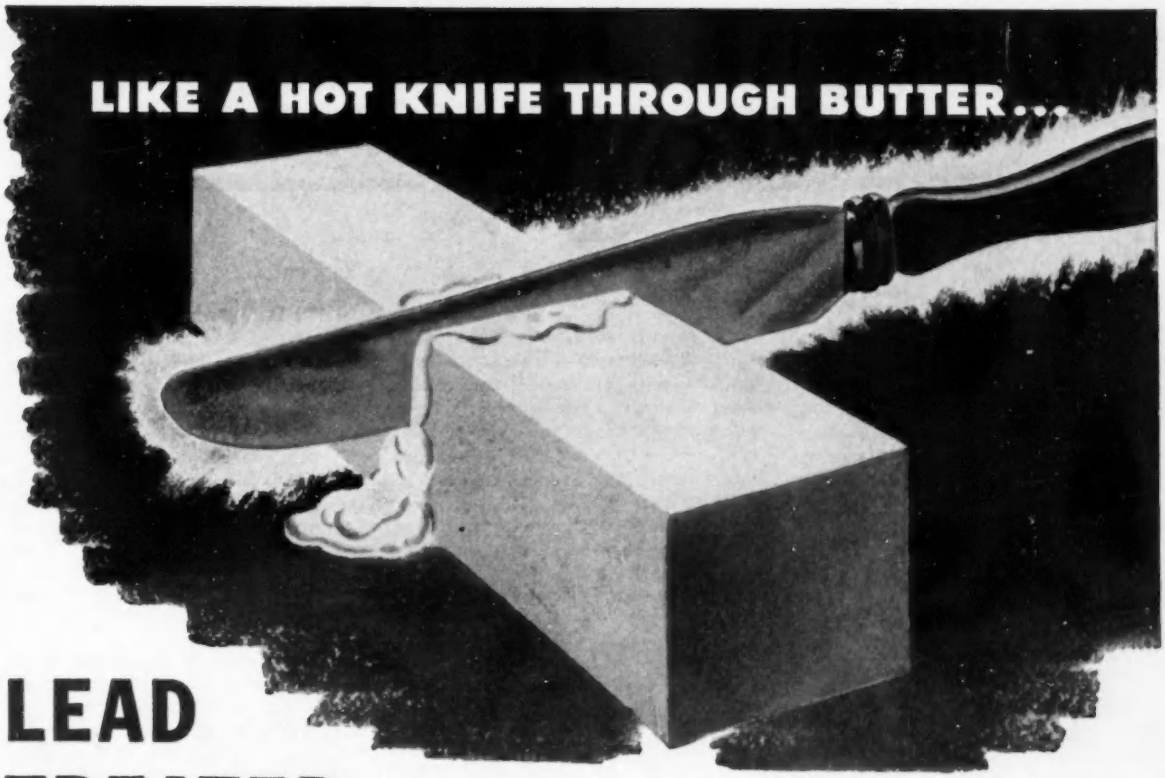

LEAD TREATED ARISTOLOY *CUTS CLEAN AND FAST*

"Machine tool production increased 35 to as much as 75 per cent"—users of leaded steels report. The addition of lead acts as a lubricant reducing friction between chip and tool. The beneficial results—faster machining speeds—much longer tool life—and vastly improved product finish. With normal heat treating, mechanical properties such as yield strength, tensile strength and ductility are unaffected.

You can obtain similar manufacturing benefits by specifying Aristoloy *leaded* alloy or Ledloy* (leaded) carbon grades. Available in all A.I.S.I. or S.A.E. standard analyses—write or call today for information about application of free cutting leaded steels to your products.

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COPPERWELD STEEL COMPANY

(STEEL DIVISION) WARREN, OHIO

For export—Copperweld Steel International Company, 117 Liberty Street, New York

Observations

By Joseph Geschelin

Zinc Grilles

Design details often go full circle only to emerge again. A good case in point is the zinc die cast grille. Stampings replaced die castings for a long period of time. 1955 models presage a return to larger and heavier die cast grilles on a number of makes.

Gasoline Injection

Direct injection of gasoline was a topic for discussion just before the war and for a time after the war. Then complete silence. We have learned recently that a number of important parts makers have revived this important project, and expect more success than did the pioneers. If direct injection does become feasible, it should lend additional efficiency and fuel economy to the current crop of motor car engines.

Hydrostatic Mechanism

Judging by the activity at the recent SAE Tractor Meeting, hydrostatic power assist devices—using hydraulic motors and pumps—are due for a big wave of adoption on all manner of farm and industrial tractors, and on earthmoving machinery. Despite some natural disadvantages, which undoubtedly can be alleviated if not eliminated, this type of power offers big gains from the standpoint of flexibility.

Statistical Quality

Just to keep up-to-date, this is to note that Monroe Calculator is distributing some excellent brochures on statistical quality control; and how the data may be handled most economically with Monroe equipment. In addition, we have just received a copy of Automotive Supplement No. 1, from the American Society for Quality Control—a compilation of some basic papers on the subject presented during the past few years.

Test Code

On several occasions recently we have commented on the need for some uniform code of engine testing to bring advertised horsepower ratings within a reasonable range of comparison. At the Chevrolet press preview held recently, E. N. Cole, defined for the first time what constitutes a bare engine in General Motors. The bare engine, according to Cole, is one that is tested without the fan, generator, air cleaner, and exhaust system. Incidentally, GM now is using the standard SAE procedure modified to fit this definition.

Proof of Pudding

Why is it that despite millions of miles of testing on the proving grounds and on the dynamometers, year by year certain cars will evidence serious trouble in one place or another when the new models get in the hands of the millions of car buyers? We have asked this question year by year. We asked it again this year. Several leading experts ventured the opinion that out of the many reasons for this paradox two stand out. One is that actually the new designs may not have had the benefit of as much pre-testing as billed. The other is that despite the amount of development preceding the introduction of a new model the type of testing that was done did not simulate operating conditions in the hands of the car owner. This, by far, seems to be the major factor. It applies particularly to the smaller and relatively less important elements of the car, ignored because of lesser importance, or short changed because they did not appear to be a focus of trouble. These require attention if owner complaints are to be satisfied.

Tubeless Tires

With returns all in, we know now that tubeless tires are standard equipment across the board. At least at the start, wire wheels will continue with conventional tires.

Exhaust Superchargers

Latest word from the commercial engine front is a more intensified adoption of turbochargers. There are several good ones on the market that have been used during the past few years. We are told of the emergence of a new make and type soon, claimed to promise important increase in output; the maker says over 50 per cent.

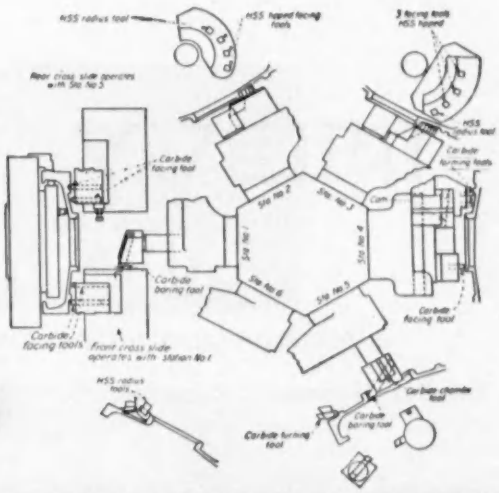
Production Advances

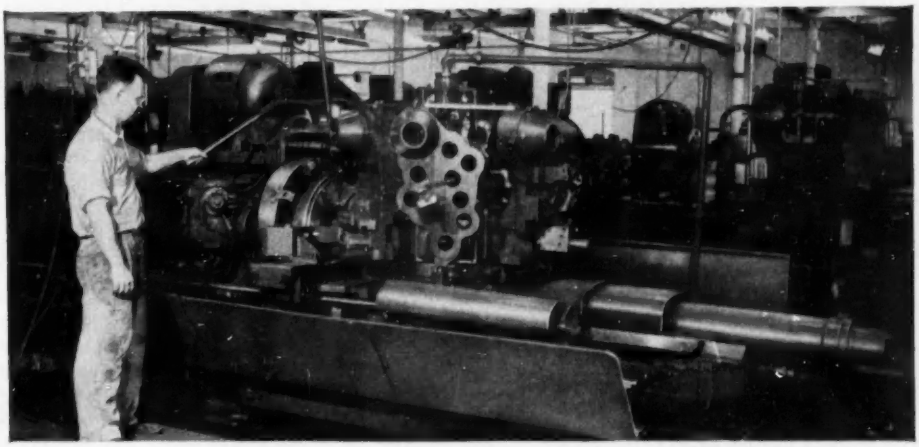
A recent visit to Waukesha Motor Co. uncovered some noteworthy accomplishments. For one thing the company has built and is in the process of building some interesting flame hardening machines, designed and made right there. This equipment is being used for hardening crankshaft pins and journals, and is being readied for hardening camshafts as well. In addition, Waukesha has two cylinder liner machine lines—one for big liners, the other for small sizes. It may sound astonishing to practitioners of the art but the new set-up requires only three basic machining steps from the rough to the finished product.

Segmented Automation

The term Automation now is very much a part of the language of the mass production industry. Latest development is the term "segmented" automation coined by Keating of Chevrolet and first mentioned at the Chevrolet press preview in October. We shall have a pictorial explanation of this philosophy very shortly. At this writing, we can say the term implies a philosophy of control that splits an automatic line or department into logical areas or segments in such fashion that a break-down at any point will not affect the operation of the rest of the set-up. Chevrolet with its enormous volume of production is unwilling to rely entirely upon a single unified department which may go down completely if any section gets into trouble.

how *Curtiss Wright* increases production





Note setup using both HSS and carbide tools to handle rough and finish cuts including 2 stations which sweep a circular swath about 2" wide.

with the

FASTERMATIC

automatic turret lathe

It's a complex machining job, this front end section for an aircraft engine. But the Fastermatic does it at a fast rate, handling 20 cuts in 37 minutes. That's because the Fastermatic has the rigidity to take multiple cuts at high speeds with carbide tools. What's more, it's all automatic operation.

Once the job is set, the machine does all the work—efficiently, and with repeat accuracy, piece after piece. Why not find out what it can do to increase your production and cut your costs?

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

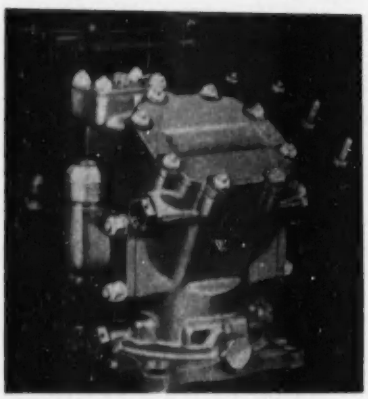
TURRET LATHES · AUTOMATIC LATHES · SUPERFINISHERS · BALANCERS · SPECIAL MACHINES

NEW AIRCRAFT PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 89

Smaller Hydraulic Pump

Variable displacement hydraulic pumps now available are said to achieve up to 37 per cent savings in weight and as much as 33 per cent



reduction in size compared to the units they replace. The new model is shown superimposed over the previous one. The improved pumps feature a redesigned yoke of alloy steel, and a housing of magnesium-zirconium alloy. The units are axial pumps with nine pistons.

Volumetric efficiency is more than 96 per cent and over-all efficiency is more than 92 per cent. The new pumps operate with substantially lower critical inlet pressures than former designs.

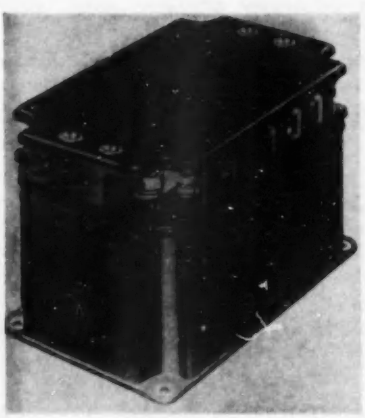
The new pump series is designed for 3000 psi operation and is available in sizes having nominal rated deliveries (at 1500 rpm) of 0.60 to 23 gpm, or 0.095 cu in./rev to 3.67 cu in./rev. The smaller size pumps can operate at speeds as high as 9100 rpm. The pumps are said to operate readily with special equipment at higher or lower temperatures than the basic range of minus 65F to 165F. Porting can be supplied at the purchaser's option and pump rotation can be either left-hand or right-hand.

The pumps can be of either uniflow or over-center design. Cylinder controls can be provided to automatically maintain a selected pressure while delivering a varying flow depending upon system requirements. An electric depressurizing control can be provided which will cause the pump to lock at minimum pressure and zero displacement while remaining instantly prepared to meet system requirements upon demand. Servo control arrangements are available which permit remote control of hydraulic power in response to an electronic signal of a few milliamps. A simple control piston can be provided for the variable displacement pump which will respond to hydraulic control pressures originating in a device supplied by the customer apart from the maker's hydraulic components. *Vickers, Inc.*

Circle 46 on postcard for more data

Circuit Breaker

Development of a circuit breaker designed for use with the complete a-c systems the company is producing for the aircraft industry, is reported.



Meeting the dimensional and performance requirements of specification MIL-C-8379 while weighing only 4.5 lb, the circuit breaker, designated type GC86, has the following features:

Balanced Rotary Latch. Latching is achieved by a balanced rotary latch employing the over-center principle. The latching surface is a roller bearing keeping latch friction to a minimum and reducing the energy necessary to trip the latch. The required tripping force is quite constant. The circuit breaker reportedly will remain latched in extreme shock conditions.

Solenoid-Actuated Contacts. Main contacts of the circuit breaker are connected directly to the plunger of a closing solenoid. The closing solenoid is designed to operate with a stroke in excess of the required contact gap. Auxiliary contacts are actuated from the closing solenoid. These contacts have a relatively long operating stroke.

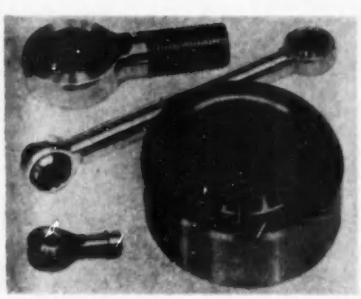
Anti-Pump Feature. Incorporation of an interlock relay provides a positive anti-pump circuit. This feature makes noncritical the adjustment of interlock contacts.

Contact Inspection. Construction of the circuit breaker allows inspection of the main contacts without disassembly of the breaker. *Jack & Heintz, Inc.*

Circle 47 on postcard for more data

Spherical Bearings

A spherical bearing is produced as two pieces by a novel method which requires no swaging operations for assembly. This feature is reported to



provide better surface conformation between ball and race, resulting in greater bearing area, and heavier allowable loads. *Delron Co.*

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THE STANDARD OF COMPARISON

METALS

With the Adjustment of Inventories Practically Completed, an Operating Rate of 70-80 Per Cent for Steel is Foreseen

By William F. Boericke

Steel Producers Optimistic For Fourth Quarter

Third quarter output of steel totaled 20,065,500 tons, a drop of 7,500,000 tons, or 27 per cent, from production in the same quarter of 1953. But by mid-October steel producers were definitely more cheerful than at any time in 1954. The operating rate had risen to 71 per cent of capacity, up from the low 60's that had prevailed in the third quarter. A firmly established business pickup was confidently expected through the fourth quarter, with the operating rate holding between 70-75 per cent, with some optimists expecting 80 per cent. This would mean a lot of steel. An operating rate of 73 per cent, based on present capacity of 124 million tons annual capacity, would mean more steel than was produced in the peak year of World War II.

There is general confidence that the present basis price structure will hold. If prices held firm during the third quarter when incoming business was admittedly slow and competition intense, steel producers reason, why fear any price cuts when users are stepping up orders and asking for speedier deliveries?

Inventory Adjustments Appear Completed

The long-drawn-out reduction in inventories appears either to have ended or to be very close to it. Perhaps the reduction has gone too far, for the keynote of new orders is for faster shipments. Producers now expect more advanced buying, particularly from Detroit where purchasing agents have been painfully slow in reaching for their order pads. Quite likely there was considerable anxiety to try out the price structure. Nothing more developed than elimination of premium prices on cold finished bars by one manufacturer, which only served to bring his products into competitive line and was not followed by others.

Without doubt the time needed for inventory adjustments was grossly underestimated by steel producers. It's now estimated that since the middle of 1953, when orders began to fall off, surplus inventories have been reduced about 10 million tons up to the present time. This is about twice as much as was expected to be necessary. During this period, mill production has been less than consumption with the difference made up from surplus stocks. Present inventories in most items are believed to equal no more than a 30-day supply.

Output Geared to Orders

While it is thought that ingot production is now tied in closely to rate of new orders received, it is quite possible that some producers are increasing output in anticipation of orders to be received. Their optimism seems justified. Demand for cold rolled sheets has improved remarkably, and there is even talk of a possible shortage by December. Galvanized products and oil country goods are firm. Silicon and stainless steel sheets are wanted. The construction boom continues to make wide-flanged structurals one of the strongest steel products. Real improvement is seen in stainless steel after months of slow demand. A modest increase in the price of tin plate effective October 1 spurred buyers. Production of this item will be at a new high in 1954.

It is true that historically steel production reaches its peak in October then slides off seasonally in the last two months of the year. But the industry is counting on the low inventory position of most consumers to reverse this trend.

A U. S. Steel official has pointed out that 1954 steel output has not paced overall industrial output and has shown a relatively greater decline during the last 12 months than manufacturing generally. He expressed himself as relatively optimistic for the rest of the year and for 1955.

Steel Scrap Advances

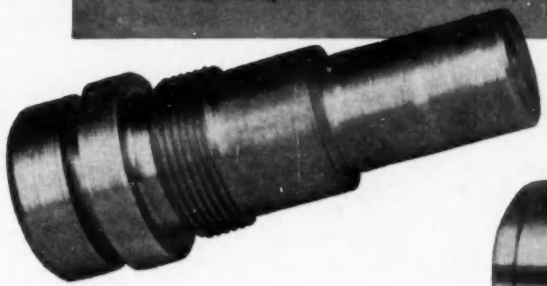
Steel scrap sold in mid-October at the highest price of the year. The composite price for heavy melting scrap advanced to $32 per ton, according to the *Iron Age*. This was ascribed to stepped up steel activity, as well as depleted inventories of scrap and higher exports which have cut heavily into supplies on the Atlantic seaboard. Whatever the reason, supplies of better grade of scrap are tightening and this is regarded as a good augury for larger steel demand.

Copper Strikes End

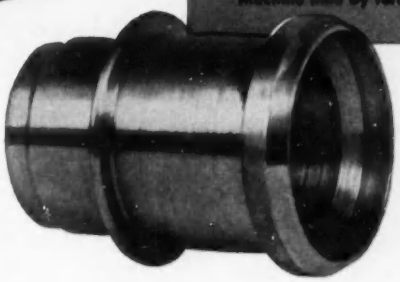
Settlement of the strike at the Anaconda mines early in October followed quickly by the end of the seven-week work stoppage at the American Brass Co. plants relieved measurably the extremely tight situation in copper supply. It had reached so acute a stage that copper users, with the backing of the Secretary

(*Turn to page* 102, *please*)

JOB FACTS:
Part . . . . . Pilot Stud—1⅝ x 6" long
Material . . . . . A-4615 CR Steel
Machine time on Model M . . . . . 7½ minutes
Machine time by former method . . . 17 minutes



JOB FACTS:
Part . . . . . Waist—8½ x 4⅝" long
Material . . . . . Loaded Open Hearth Steel
Machine time on Model M . . . . . 8¾ minutes
Machine time by former method . . 21 minutes



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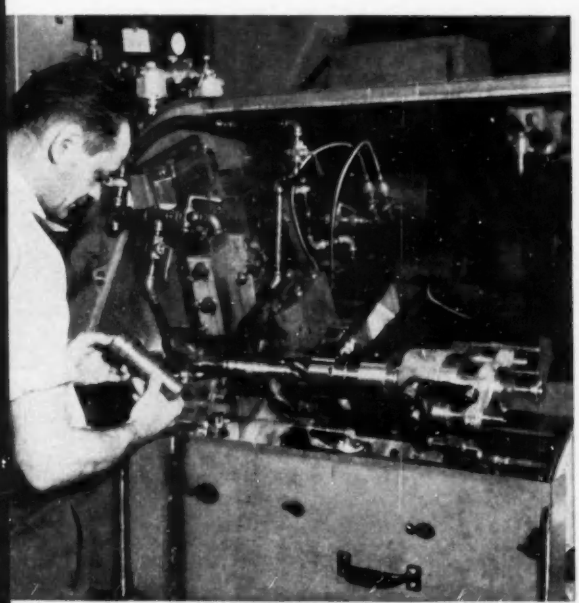
more than just speed

to keep production on schedule



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Take the parts shown. In both cases, the completed pieces are machined automatically at their same predetermined rate every time, without interruption. In the long stud there are 11 operations including threading—the piece is completed on the Model M in less than half the time of the former method. In the other piece (with a large hole partway and a small one the rest of the way) spindle speeds are changed automatically during the cycle to provide the best speeds and feeds for different diameter cuts—and the time for a finished piece is less than ⅓ that of the former method.

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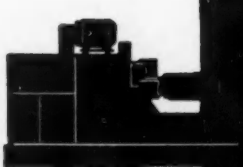

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SAE Aeronautic Meeting

(*Continued from page 57*)

ments were described by W. L. Howland and C. J. Buzzetti, Lockheed Aircraft Corp. Theoretical calculations and wind-tunnel measurements are helpful, but cannot yet foretell the stresses and strains of rapid maneuvers, or of buffeting, door, and landing loads. Indications are that the Civil Aeronautics Authority may require in-flight load measurements before certifying high-speed transports.

Development of a 500-hp gas turbine for driving an air compressor was described by P. G. Carlson, Solar Aircraft Co., San Diego, Calif. Producing compressed air instead of shaft power, it operates in mobile ground power units to start large aircraft turbojets. The new air starter is light, operates on almost any available fuel, starts readily in coldest weather, and is relatively cheap to buy and run.

The engine, including reduction gear and accessories, weighs about 1¾ lb for each horsepower produced, has a full load specific fuel consumption of 0.90 pounds per hp-hr, and shows promise of installation and maintenance costs less than that of comparable reciprocating prime movers.

A prediction that the "thermal barrier" will be just as successfully passed as the "sonic barrier" was made by J. V. Long and G. D. Cremer, Solar Aircraft Co. They proposed the broader utilization of metal sandwiches in aircraft construction, particularly where it is possible to utilize the all-metal honeycomb type, which they said is satisfactory to aircraft skin temperatures of 1500F. Excessive skin temperatures, they said, may be countered by fluid cooling.

Spencer L. Shaw, Douglas Aircraft Co., El Segundo, Calif., described the general problem of materials for high speed planes as one of finding the lightest aircraft material which satisfactorily performs a given function. He said materials must have not merely strength, but also suitable stiffness, fatigue strength, availability, corrosion-resistance, wear-resistance, formability, machinability, and toughness. He reported that aluminum alloys are adequate for skin temperatures up to 200F, that titanium alloys serve well to 700F, and that stabilized stainless steels and cobalt base alloys are satisfactory up to 1400F.

Sustained speeds up to 3000 mph at sea level and 7000 mph at 185,000 ft will be possible with materials already tested for this purpose, Shaw said.

C. S. Brandt, Convair Div., General Dynamics Corp., San Diego, Calif., reported synthetic lubricants have exhibited some superior service characteristics in airplane use, although there is still room for improvement.

Some of the synthetics contribute superior load-carrying ability, good temperature and viscosity stability, and elimination of turbine-bearing coking difficulties. However, precautions must be taken to prevent stripping paint from engine and plane, destruction of wire insulation, and particularly, cabin contamination from gases causing crew and passengers to suffer throat disorders, watering eyes, and nausea.

Brandt stated not all types of all synthetics create all these difficulties, but warned that radical changes in their characteristics are mandatory and that specifications must be narrowed for improvement of the lubricants. Regardless of whether lubricants are of synthetic origin, a clean source of engine bleed air for cabin conditioning must be provided to prevent exposure to noxious or irritating contaminants, since any oil will decompose when subjected to extreme temperature and pressure changes.

Housekeeping problems occasioned by broadening use of electronic equipment on aircraft were outlined by R. J. Cary, Ryan Aeronautical Co., San Diego. Difficulties are encountered not only in finding suitable places to put the equipment aboard planes and in servicing it, but in insuring its reliability and, thereby, reducing servicing needs. Attempts currently are being made to reduce sizes and to unitize equipment, as well as to simplify it on the theory that simplicity leads to reliability.

Engineers recommended that aircraft design should seek to prevent service failures by contemplating and counteracting sources of structural fatigue. It was proposed that designers consider both the contemplated uses and operational environments of aircraft, taking cognizance of such factors in structural fatigue as limit loads, design range, operating altitudes, and basic types of mission flown—plus the effects of gust loads, maneuver loads, landing-taxi loads, and the ground-air-ground cycle.

George N. Mangurian and Philip D. Brooks, Northrop Aircraft, Inc., explained that "fatigue" loads encountered by an all-purpose fighter plane which spends 50 per cent of its life at high altitudes differ greatly from those affecting a long-range interceptor plane which experiences maneuver loads for only a fractional part of its operation. The life expectancy of the interceptor plane is four times that of the fighter.

Recalling that all planes suffer some fatigue loading, they warned that a 10 per cent increase in gust loads could reduce life expectancy 18 per cent, a 10 per cent increase in maneuver loads could curtail expectancy 38 per cent, and a 10 per cent increase in all load levels could cut life expectancy 48 per cent. Transport planes are profoundly affected by the ground-air-ground cycle, an inescapable maneuver which contributes directly to fatigue failures.

A carefully prepared engineering plan of attack against aircraft fatigue was suggested by A. J. Kullas, The Glenn L. Martin Co., Baltimore, Md. He said that the growing number of fatigue failures is cause for concern and that "sporadic failure" no longer is an acceptable excuse.

Mr. Kullas proposed that a life goal in hours be established for each model; that preliminary design include consideration of relationships between fatigue life and speed, wing loading, load factor, and altitude; that components be strengthened when and where need is indicated; and that repeated load tests, service records, and inspection reports constantly be reviewed and correlated to ascertain where design and construction improvements should be made. Figure 3 shows hours of life versus limit load factor.

Application of relatively simple radar equipment to transport planes can contribute to passenger comfort and safety, as well as schedule reliability, by enabling the transports to detour storms and fly less turbulent routes.

Edgar A. Post, United Air Lines, Denver, Colo., said that while such installations still are experimental and provide neither crystal balls nor the complete answer to avoiding rough flights, they can contribute to operating safety and efficiency and also give flight crews added confidence when storm clouds appear. He explained that with the new weather radar, flight crews can detect storm centers 75 miles away and dodge them by flying no more than five miles off course. They can also establish plane positions relative to ground features.

Mr. Post added that radar-equip-

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SHORTIES

The number of cars, trucks and buses registered in the U. S. in 1954 is expected to reach a record total of more than 58 million. The total includes some 48 million passenger cars and 10 million trucks and buses.

•

Latest estimates of world motor vehicle registrations show that the U. S. now has about 74 per cent of all passenger cars and 48 per cent of all trucks in the world.

•

U. S. motor vehicles are traveling a record distance of more than half a trillion miles per year, and the number of car, truck and bus drivers in the country now is estimated at 70 million.

•

Gasoline consumption in the U. S. has hit a new record of more than 42.7 billion gal a year.

•

More families than ever now own automobiles in America. The latest count of 35 million represents 70 per cent of all families.

•

More than three-fourths of world passenger car production and nearly half of world truck production are in the U. S.

•

California leads all states in motor vehicle registrations with more than 5½ million.

•

U. S. farmers own nearly seven million cars and trucks.

•

During World War II, the Air Force needed approximately two engines to support each engine installed in a bomber. Today, only one "backup" engine is required for every two installations.

•

The Air Force has 179 installations in the continental U. S. They are located in 42 states and the District of Columbia.

•

Gas temperatures in rocket motors run as high as 6000 F.

(*Continued from page 98*)

ped planes can avoid hail as well as rain and warn other planes before they get into danger zones.

Utilization of high-speed motion pictures in developing adequate packaging materials and techniques was explained by R. D. Hawkins, Sperry Gyroscope Co., at a symposium on compatible design of equipment and its packaging. High-speed motion pictures are helpful also in studying the shock and vibration encountered by parts at accelerated rates of operation. This direct method is independent of the proper functioning or accurate calibration of instruments.

"One take," he added, "provides information which might otherwise require six or more pick-ups and a multi-channel recorder. In small assemblies, high-speed photography permits measurements where pick-ups could not be used because of the small size of parts."

J. T. Miller, also of Sperry Gyroscope Co., told the meeting that certain theoretical considerations and a simple dynamic load test help reveal the suitability and service of packaging materials. This load test involves driving a body into a resilient material, recording both the displacement and force, and comparing the result with a calculated pulse.

Rt. Hon. Clarence Decatur Howe, Minister of Defense Production and Minister of Trade and Commerce for Canada, reported on the progress of Canadian aviation. "We have decided that our major military effort will be in the field of aviation, and the sharing of tasks arranged through NATO is such that our contributions to the common effort will be in the fields of training, anti-submarine patrol, and fighter forces. Therefore, our industrial effort is concentrated on aircraft for these duties. Support operations are carried out using aircraft purchased from other countries, or with aircraft developed from existing types available to us. In our specialized fields, we do not seek to develop our own equipment if we can obtain a satisfactory type elsewhere. If such a type is available, we normally obtain a license to manufacture in Canada. If our military advisers decide that Canadian problems require a solution different from that needed elsewhere, then we undertake the necessary development.

"In addition, the government is supporting aircraft developments which are useful to the military and which may have commercial possibilities. There is thus a possibility of reducing the Government outlay needed to keep the industry in a state of readiness. In summary, our policy on development is to undertake such work when it is necessary to meet our military situation, or when it appears to be economically sound. National pride is not permitted to stand in the way of sensible policies. This policy applies to civilian type aircraft as well. Trans-Canada Air Lines, although Government-owned, is free to purchase its aircraft as its management may decide."

For his services to aviation, Mr. Howe was awarded the Daniel Guggenheim Medal by J. Carlton Ward, Jr., chairman, Daniel Guggenheim Board of Award.

Thirty-eight manufacturers exhibited at the Aircraft Engineering Display: Lear, Inc., Los Angeles; Aeroproducts Operations, Allison Division, GMC, Dayton, O.; Sun Electric Corp., Chicago; The Cleveland Pneumatic Tool Co., Cleveland; Bendix Products Div., Bendix Aviation Corp., South Bend, Ind.; Franklin C. Wolfe Co., Inc., Culver City, Calif.; Western Gear Works, Lynwood, Calif.; Hi-Shear Rivet Tool Co., Los Angeles; Rosan, Inc., Newport Beach, Calif.; Resistoflex Corp., Belleville, N. J.; New York Air Brake Co., New York City; Meletron Corp., Los Angeles; General Controls Co., Glendale, Calif.; Stratos Div., Fairchild Engine & Airplane Corp., Bay Shore, N. Y.; Solar Aircraft Co., San Diego, Calif.; Lord Mfg. Co., Erie, Pa.; Aeroquip Corp., Jackson, Mich.; Monogram Mfg. Co., Culver City, Calif.; O & M Machine Co., Los Angeles; Red Bank Div., Bendix Aviation Corp., Eatontown, N. J.; Pacific Scientific Div., Bendix Aviation Corp., South Bend, Ind.; Magnaflux Corp., Los Angeles; American Steel and Wire Div., U. S. Steel Corp., Pittsburgh, Pa.; Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.; Sinclair Refining Co., New York City; Titeflex, Inc., Newark, N. J.; Scintilla Magneto Div., Bendix Aviation Corp., Sidney, N. Y.; Pacific Airmotive Corp., Burbank, Calif.; Vickers, Inc., Detroit; Wyman-Gordon Co., Worcester, Mass.; AiResearch Mfg. Co., Los Angeles; Keystone Engineering Co., Los Angeles; Foote Bros. Gear & Machine Corp., Chicago; Fairchild Engine & Airplane Corp., Farmingdale, Long Island, N. Y.; A. O. Smith Corp., Los Angeles; Rubber Teck, Inc., Culver City, Calif.; Ryan Aeronautical Co., San Diego, Calif.; Marrotta Valve Co., Boonton, N. J.

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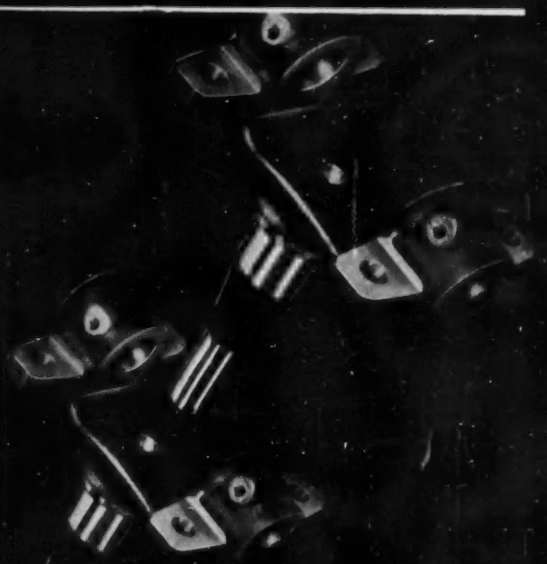

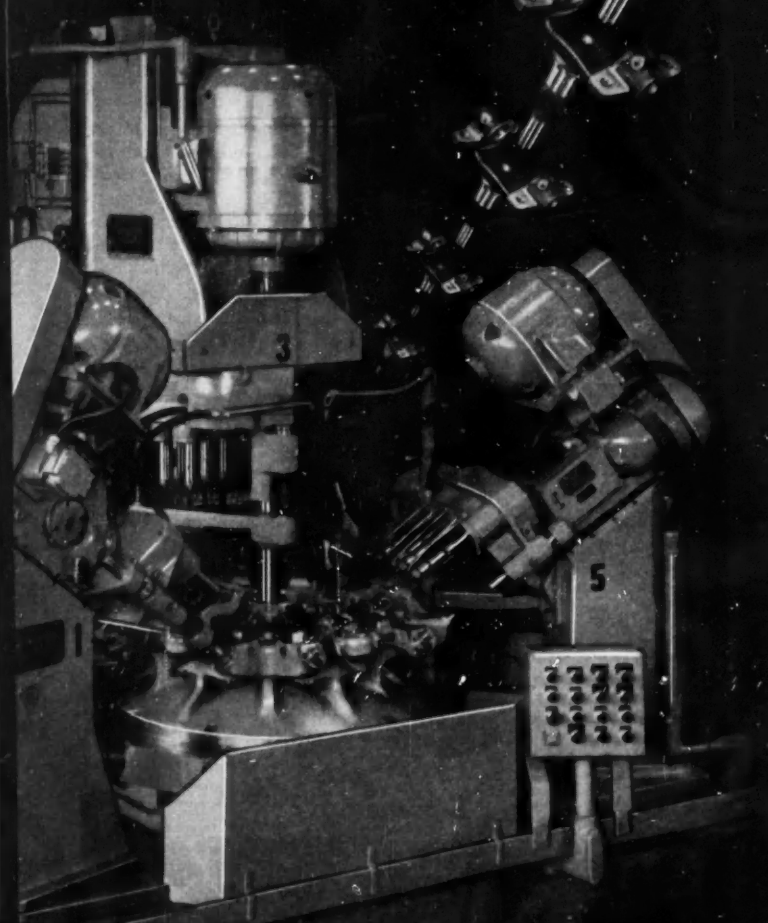

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METALS

(*Continued from page 96*)

of Commerce had petitioned Washington to defer copper deliveries to the stockpile in order to alleviate the shortage.

Much to the chagrin of consumers this petition was denied, chiefly by the insistence of the Labor Secretary that approval would be interpreted by the labor union as a strike-breaking measure. The fact that widespread unemployment in the fabricating plants would result from inability to obtain the metal apparently carried no weight.

London Bids High for Copper

In London and on the Continent copper users were panicky over strikes in Chile that had cut off supplies. Many copper dealers had sold the metal short on the Metal Exchange against purchases of Chilean copper, a common method of hedging. With no adequate supplies available, they were obliged to bid as high as 38 cents per lb to cover contracts.

However, domestic copper producers refused to be stampeded and held steadily to their established 30 cent price for such metal as they had to sell, although it was common knowledge that undercover business was being done for limited amounts of copper at 33-34 cents per lb. The real pinch is likely to come in November when inventories will be near exhaustion with no relief from new production because of the 60-day interval needed to process copper concentrates into electrolytic metal.

Domestic Producers Hold The Price Line

No doubt the reluctance of the big producers to advance the copper price is caused by belief that such a move would play directly into the hands of the aluminum producers, who have emphasized their ability to furnish unlimited amounts of their metal at a stable price, in markets where aluminum is competitive with copper. It would also be inconsistent with the lately announced ambitious advertising program of the Copper & Brass Research Association, in which the keynote is assurance of adequate supplies to consumers for an expanding economy at a reasonable price.

The outlook for the balance of the year is for a firm market but the price will probably remain undisturbed.

Bureau of the Census is now sending to the printer the report forms to be used in the forthcoming 1954 Censuses of Business, Manufacturers, and Mineral Industries. These forms will be distributed early in 1955 to all establishments from which individual reports will be required.

Federal outlays for research and development programs in the present fiscal year will drop about 10 per cent from fiscal 1954 figures to approximately $1.99 billion.

Tax rates next year may edge up a little higher, rather than come down as had been planned. The widening gulf between Federal income and spending is responsible.

Office of Distribution, Business and Defense Services Administration, has announced conversion of its monthly publication, the "Distribution Data Guide," to a subscription basis commencing with the October, 1954, issue.

Office of Defense mobilization is increasing the percentage of capital investment eligible for fast tax write-offs for firms locating defense plants in labor surplus areas.

Dictionary of specifications used by the Federal Government in its military and civilian buying is now available to businessmen. it is available for 25¢ from the Superintendent of Documents, Washington 25, D. C.

The Navy has found longer service life is provided for aircraft engine cylinders by the application of chromium coating to the cylinder walls.

PARIS SHOW

(*Continued from page 51*)

American body builder Darrin, exhibited plastic bodies on small French sports cars.

An outstanding feature of the commercial vehicle section of the show was a Berliet four-axle tractor of 25 tons deadweight, powered by a 12-cylinder Diesel of 450 hp and capable of hauling 200 tons. It is intended primarily for military service, but has an application on oil fields and the maintenance and construction of pipe lines. This 8 x 8 tractor has a forward mounted engine with a displacement of 1360 cu in. It develops its maximum power at 2200 rpm. It is evident that the engine is a grouping of Berliet's six cylinder models.

A new 4 x 4, displayed by the French Saurer Co., was powered by a 130 hp light alloy Diesel. It had five speeds, with two ranges in the transfer box, front axle being automatically brought into engagement on the use of the lower ratios. A locking type differential was fitted.

Light motorcycles, powered bicycles, and scooters are showing a tremendous growth in nearly all European countries, due to the rising standard of living. In France alone production of light motorcycles jumped during the period January to August to 127,000 compared with 85,000 a year earlier. Scooter production went up 18 per cent. This growth suggests a bridging of the gap between the scooter and the smallest automobile, and has revealed itself notably in the Isella, a closed scooter with a front entrance, originating in Italy but now built in both France and Belgium, the Messerschmit, and the Hoffmann Auto-Kabine. This latter has a light chassis narrowing at the rear, with a rear mounted 15.2 cu in. aircooled two-stroke engine. Total weight is 770 lb. Under European economy conditions this development of the scooter is being taken seriously and in many cases it is being encouraged by the waiving of driving licenses, registration and taxation.

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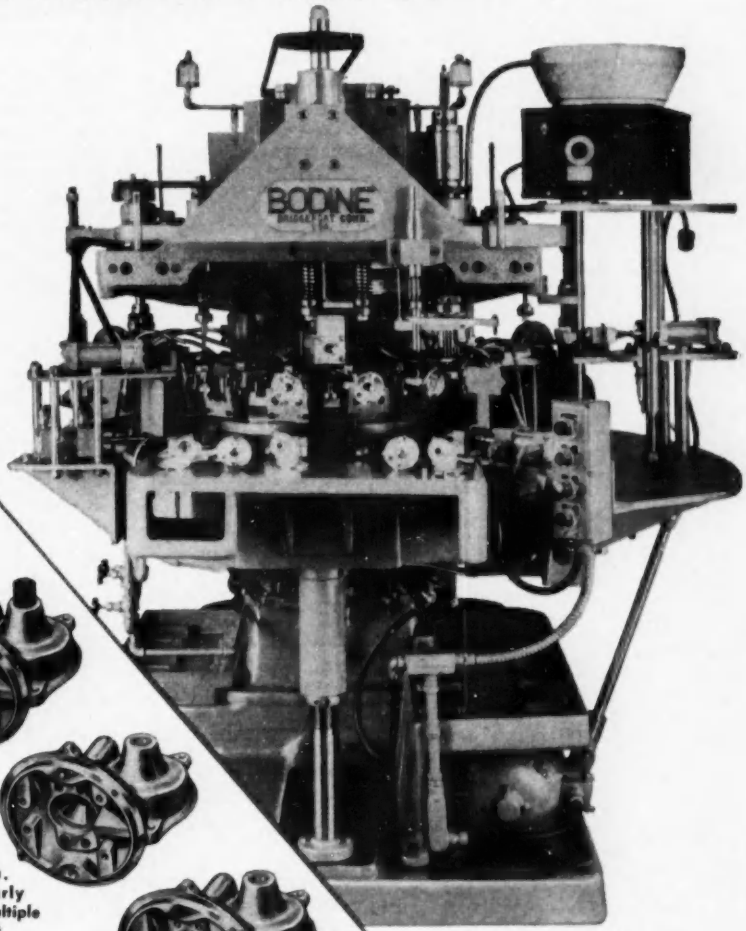
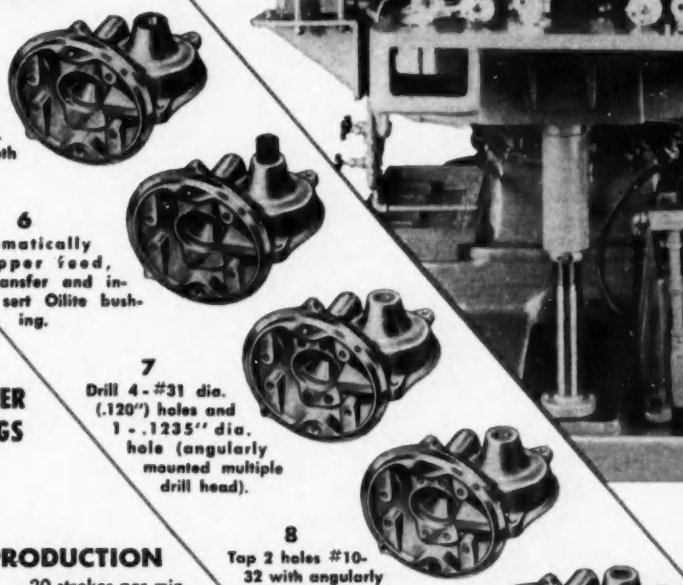
MANUFACTURING

Bodine CASE HISTORY NO. 37





5
Spot face ⅝" dia. maintaining depth to ± .002".

6
Automatically hopper feed, transfer and insert Oilite bushing.

7
Drill 4 - #31 dia. (.120") holes and 1 - .1235" dia. hole (angularly mounted multiple drill head).

8
Tap 2 holes #10-32 with angularly mounted 2-spindle tap head.

9
Size I.D. of Oilite bushing to .3735" - .3745" dia.

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One piece per stroke . . . 20 strokes per min. — 1000 pieces per 50-min. hour. 10,000 individual operations per 50-min. hour.

MATERIAL

S.A.E. #925 Die Casting (Parts No. EMG-2, EMG-3, right- and left-hand).

TOLERANCES

(Other than specified above) Drilled holes: Size .001". Location: ± .002". Tapped holes: Class 2 threads.

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AUTOMATIC DIAL TYPE DRILLING, MILLING TAPPING, AND SCREW INSERTING MACHINES

19D54

Pontiac for 1955

(*Continued from page 61*)

veloped by Pontiac for this engine. It is a full pressure system delivering oil to the crankshaft bearings, connecting rod bearings, camshaft bearings, and the valve actuating mechanism. Oil under pressure is supplied by a helical gear pump mounted at the rear bottom of the cylinder block, housed within the oil pan. Using a floating oil intake, surface oil is directed first to a full flow oil filter (accessory), then to two parallel oil galleries drilled in the block. Oil travels from the rear to the front in the left hand gallery, then rearward in the right hand gallery.

Hydraulic valve lifters are intermittently lubricated and supplied from holes drilled from each of the two galleries, and each of the hollow pushrods is fed through holes in the valve lifters, thus leading pressure oil to each point of contact between the pushrod and rocker arm.

Oil is positively fed to the cylinder head to lubricate important valve mechanism bearing surfaces. Oil flows from the camshaft bearings to galleries in the heads, then goes to a drilled central hole in each valve rocker arm ball stud, leaving through a drilled opening discharging inside the rocker arm ball.

The timing chain is lubricated from two holes drilled in the front of the camshaft.

Cylinder wall lubrication comes from oil thrown from each connecting rod journal. The supply to cylinder walls serves to provide splash lubrication to the piston pin bushings from a cup-like depression at the piston pin end of each rod.

In addition, a stream of oil is forced under pressure against the cylinder walls from a small groove in the connecting rod cap from the opposite cylinder.

Oilpan design has been given considerable attention. It is made deep to minimize foaming and splashing even on turns and fast acceleration. A baffle, extending across the entire sump area, prevents oil from being thrown against the crankshaft. This baffle is attached to the main bearing caps. Of five-quart capacity, the oilpan is designed to seal directly to the chain cover at the front end, on an angular surface.

Another Pontiac "first" is the development of complete pressure-suction crankcase ventilation. Air from the fan stream enters through two filter caps near the front and top of each valve cover, flows into the engine from the front and rear through cored openings leading into the valve gallery, thence to the crankcase. Air enters the crankcase at both ends, then is forced into the crankcase area with added turbulence induced by crankshaft rotation. By means of special baffling, air is forced to travel in a path under pistons 1, 2, 7, and 8, and to the center of the engine to exhaust through an opening in a positively sealed center baffle, into a baffle chamber, and out through a road draft tube.

A distinctive system of engine cooling also has been developed. The centrifugal water pump, mounted within the cast timing chain cover, has its inlet hose-connected to the radiator, while outlets lead from the pump body to the front of each cylinder head. Each head is provided with a brass water distributing tube containing openings which direct the coolant in jet fashion onto the exhaust valve seats.

Highest Precision
HARDENED & GROUND PARTS
THE ball stud shown here is a perfect example of the precision methods and quality material that go into the production of all Brown Hardened and Ground Parts. Twelve separate operations are employed to produce this vital part. Every feature about this ball stud *has* to be right—every feature *is*. It has strength, wear resistance, precision fit, true-ground spherical and tapered surfaces, close inspection and strict uniformity.
Brown Hardened and Ground Parts have been serving the automotive industry for over 40 years. We refer you to any of our long list of satisfied customers. For information pertaining to your own requirements, simply write or wire.
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Parts Include . . .
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SLASH costs

—while you boost performance!

See what Reynolds Aluminum can do in your automotive electrical systems

The automotive industry calls on Reynolds for Products that help reduce fabricating costs—help assure finer performance. See how Reynolds Aluminum does this in the field of *automotive electrical systems.*

Proved by Years of Testing—aluminum battery cables are lighter in weight, far less expensive than other types. Yet there has been no sacrifice in performance.

Aluminum Distributor Cap Inserts are used in approximately half of today's automobiles. Aluminum is a "natural" here because of its resistance to corrosion, high electrical conductivity and exceptional formability. Cost of material is 75% *lower* than that of material previously used!

Aluminum Field Coils have been used in fractional horsepower motors for years. Now appearing in generators, they offer amazing reductions in cost and weight. Reynolds technical skills contributed greatly to this advancement.

Aluminum Replaces More Expensive Materials in parts requiring a non-magnetic material; solenoid core tubes and relay brackets, for example.

Reynolds Aluminum Stylists and Engineers will be glad to work with you on your styling and design problems. For complete details, contact the Reynolds office listed under "Aluminum" in your classified telephone directory—or call your nearby Reynolds Aluminum Distributor. If you wish, you may write Reynolds Metals Company, 1212 Fisher Building, Detroit 2, Michigan, or 2587 South Third Street, Louisville, Kentucky.

See "Mister Peepers", starring Wally Cox, Sunday nights on NBC-TV

REYNOLDS ALUMINUM

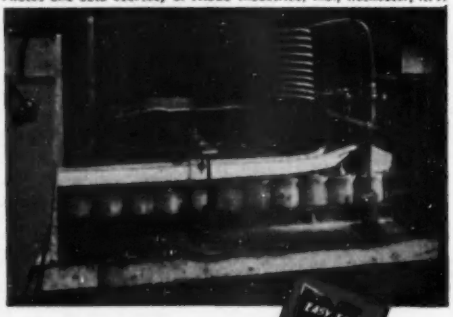
MODERN DESIGN HAS ALUMINUM IN MIND

HERE'S A TYPICAL EXAMPLE of the reasons why the EASY-FLO low-temperature silver brazing alloys are so extensively used in the automotive and aviation industries. It shows how easy it is to get fast production of high-strength liquid and gas-tight joints with these alloys. And note that no brazing skill is needed. All this adds up to metal joining costs that are surprisingly low.

EASY-FLO 45 WIRE RING

The unit is a pressure switch which is part of the Studebaker anti-creep "hill holding" device. The job is brazing the threaded spud into the cover. Operator sets covers in cylindrical holders on an endless chain and in the covers she places the spuds, each one with a ring of EASY-FLO 45 preplaced. Assemblies pass thru an induction heating coil (below) — 14 a minute.

Photos and data courtesy of FASCO Industries, Inc., Rochester, N.Y.



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Without obligating you in any way, we'll send a field service engineer to help you work out similar fast, economical production set-ups on your brazing jobs. Just write and say when you would like him to call.

FOR EASY-FLO FACTS IN PRINT . . .
write for Bulletin 20.

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Packard's 1955 V-8s in Production

(*Continued from page 66*)

from above for the various milling operations.

Upon leaving the rotary machine, various gages are used to check the machined surfaces of the head. It is then conveyed to a 19-station W. F. & John Barnes transfer unit, where it is loaded with the exhaust side up and the combustion chamber to the left. This machine performs numerous drilling, spot-facing, boring, reaming, countersinking, and milling operations. At the seventh station of the unit, a positioning fixture tips the cylinder head 12 deg and at the 15th station, the head is turned 45 deg in order to machine the spark plug holes. The workpiece is then turned 123 deg so that the joint face is down and the intake manifold is to the right-hand side. It is then unloaded and inspected.

Further drilling and countersinking, as well as tapping operations, are carried out during the next phase in an 18-station W. F. & John Barnes transfer machine. Most of the work done in this piece of equipment is performed on the exhaust and intake manifold surfaces of the head. Material removal operations are also carried out on the valve cover holes, oil galleries, and water pump mounting holes. At the seventh station of the machine, the cylinder head is rotated 90 deg so that the intake manifold pad feeds in. After automatic removal from the Barnes unit and a thorough inspection, the workpiece is loaded with the joint face to the left-hand side and valve holes horizontal with the intake manifold pad side down into another Barnes five-station transfer machine. Valve seats are faced, and valve guide holes are finish bored by the tooling in this unit. When this operation is completed, the head is deburred and then sent through a washing machine. Many types and makes of gages such as Sheffield Precisionaire, Brush Surfindicator, and Whittington are utilized for the thorough inspection of the workpiece.

The head, which first receives an air test, is then given a thorough leak down test in a unit designed and built by Modern Industrial Engineering.

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PROPERTY AND APPLICATION DATA ON THESE VERSATILE ENGINEERING MATERIALS: "ZYTEL," "ALATHON," "TEFLON," "LUCITE."

NEWS

NO. 8 — 1954

Sweating Eliminated in Air-Conditioning Parts Molded of Du Pont ZYTEL*

Bearings of TEFLON® are self-lubricating

Du Pont "Teflon" tetrafluoroethylene resin has generated widespread interest in the mechanical industries. A unique bearing material, "Teflon" is self-lubricating. "Teflon" has a very low coefficient of friction. The frictional coefficient of "Teflon" on "Teflon" is equal to that of ice on ice.

The coefficient of friction of this engineering material stays virtually constant through load changes and temperature changes to 500°F. It has zero water absorption—won't shrink, swell, crack or harden because of moisture. Mechanically strong, "Teflon" has good impact strength and abrasion-resistance, under normal conditions of speed and load. The addition of fillers to "Teflon" provides specialized engineering materials for specialized jobs.

If you have a bearing design problem, the answer could be "Teflon." For more detailed information about "Teflon", mail the coupon on the reverse side of this page.

"Zytel" nylon resin is precision molded into intricate shapes requiring no secondary refinishing; is functional, decorative

Du Pont "Zytel" nylon resin is being used throughout this new automotive air-conditioning system—for air deflector hoods, recirculated air intake grilles, air director shutters and grilles and base units. "Zytel" gives these components many advantages over former units. Sweating, which was a major problem with the materials formerly used, is now eliminated. There's no moisture problem with "Zytel".

This engineering material is strong—extremes of heat, cold and moisture don't affect its usefulness. Toughness is an important factor with the deflector hoods and air directors which are handled and adjusted frequently. Moreover, "Zytel" damps vibration, operates quietly, assures long service life.

Production Economies

Substantial production economies are also possible. Through precision injection-molding, mass production of these intricately shaped parts is achieved. Parts made of "Zytel" need no secondary machining or finishing. Color can be molded in. There are no plated or painted surfaces to peel or chip. The smart appearance of these parts demonstrates how "Zytel" performs both functionally and decoratively.

This air director hood assembly molded of Du Pont "Zytel" nylon resin is tough—frequent handling won't damage it. Molded by Bolta-Carpart, Inc., Owosso, Michigan.

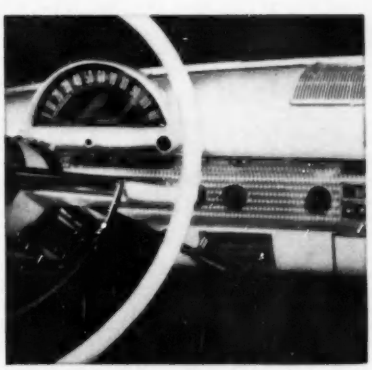
Expanding Use

"Zytel" and the other Du Pont engineering materials are finding an ever expanding market in the automotive industry. Their unique combination of properties enables automotive engineers to design parts that not only give improved performance, but also

(*Continued, column 1 back side*)

Air Director and shutter assembly. These molded parts of Du Pont "Zytel" need no machining or finishing operations.

Steering wheel medallion of Du Pont "Lucite" is pleasantly warm to the touch . . . adds decorative touch of great beauty.



Instrument panel with fixtures of Du Pont "Lucite" acrylic resin are easy to keep clean . . . provide maximum visibility.

OVER

*"*Zytel" is the new trade-mark for Du Pont nylon resin.*

DU PONT

PROPERTY AND APPLICATION DATA ON THESE VERSATILE ENGINEERING MATERIALS: "ZYTEL," "ALATHON," "TEFLON," "LUCITE."

NEWS

NO. 8 — 1954

"Zytel" (*continued*)

afford substantial savings in production and assembly costs as well.

Molded parts of "Zytel" nylon resin are both functional and decorative. Colors are molded in—there are no painted or plated surfaces to peel or chip. Parts for this air-conditioning unit are molded by Bolta-Carpart, Inc., Owosso, Michigan.

For complete information on these Du Pont engineering materials, clip and mail the coupon below.

Investigate Du Pont engineering materials in your product development programs

One of the family of these versatile engineering materials is often a key factor in product improvement or new product design.

The wide range of properties available with "Alathon"* polyethylene resin, "Lucite"* acrylic resin, "Teflon"* tetrafluoroethylene resin, and "Zytel"† nylon resin are helping solve industrial design problems.

NEED MORE INFORMATION?

Clip the coupon for additional data on the properties and applications of these Du Pont engineering materials.

Thinwall tubings of Du Pont TEFLON® resist heat, cold, corrosion

Another useful form for Du Pont "Teflon" tetrafluoroethylene resin is as extruded wire coatings and tubing. Thinwall, flexible tubings of "Teflon" are chemically inert. They are unsurpassed for lightweight fluid or gas tubing. As electrical insulation, these tubings of "Teflon" have high dielectric strength

Flexible tubings of Du Pont "Teflon" tetrafluoroethylene resin are lightweight, chemically inert, non-contaminating, and have excellent dielectric properties. This tubing is made by the Halogen Insulator and Seal Corp., Franklin Park, Illinois.

(400/500 volts/mil.) and a power factor less than .0005 from 60 cycles through 10^6 cycles per second, the part of the spectrum measured so far. They withstand temperatures from —450°F. to 500°F.

Flexible tubings of "Teflon" are easy to handle and can be cut with a knife, and bent by hand. Used as stock for machining small parts, machining time is minimized, parts are sufficiently uniform for colletting.

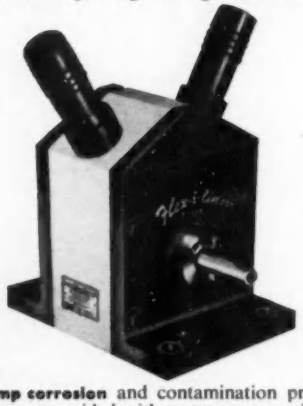
Can you use Du Pont "Teflon" in your operation? For complete information on this outstanding engineering material, clip and mail the coupon below.

New pump of ALATHON® designed so metal won't contact corrosives

This patented pump features a body block of molded Du Pont "Alathon" polyethylene resin. The "Flex-i-liner" pump is designed to keep fluids passing through in contact only with the "Alathon." Corrosion and contamination problems are eliminated.

The body block of "Alathon" resists a wide range of corrosive fluids and abrasive slurries. Its simplified design eliminates stuffing boxes and shaft seals, so external leakage is avoided. The pump is self-priming—needs no check valves and gaskets. "Alathon" also gives the "Flex-i-liner" pump lightness and strength.

The lightness, toughness, corrosion-resistance, excellent dielectric properties and easy moldability of Du Pont "Alathon" are important advantages which the automotive engineer can use profitably. Use the coupon on this page to get complete property and test data on this unique engineering material.



Pump corrosion and contamination problems are avoided with a strong, corrosion-resistant body block of Du Pont "Alathon" polyethylene resin. "Flex-i-liner" pump, manufactured by Vanton Pump and Equipment Corporation, New York City.

Manufacturer cuts costs with "Zytel" in pre-winder tool

"Production costs reduced"—that's the report of the Heli-Coil Corp., Danbury, Conn., now that they use Du Pont "Zytel" for the body of their pre-winder tool. This tool, which screws in helical inserts that provide precision threads in tapped holes, is 75% lighter than the material previously used. The tough, abrasion-resistant threads molded into the part of "Zytel" last twice as long as with previous material, the manufacturer states. Parts are molded by Molding Specialists, Inc., Yonkers, New York.

E. I. DU PONT DE NEMOURS & CO. (INC.)
Polychemicals Department
Room 1711, Du Pont Building, Wilmington 98, Delaware

Please send me more information on the Du Pont engineering materials checked: ☐ *"Zytel"*; ☐ *"Alathon"*; ☐ *"Teflon"*; ☐ *"Lucite". I am interested in evaluating these materials for:*

NAME _____ POSITION _____

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*"Alathon", "Lucite", "Teflon" are registered trade-marks of E. I. du Pont de Nemours & Co. (Inc.)
†"Zytel" is the new trade-mark for Du Pont nylon resin.

CALENDAR

OF COMING SHOWS AND MEETINGS

National Metal Congress and Exposition, International Amphitheatre, Chicago, Ill. .....Nov. 1-5
Fourth Transport Aircraft Hydraulic Conference, Park Shelton Hotel, Detroit, Mich. .....Nov. 3-4
AMA Annual Finance Conference, Hotel Roosevelt, New York, N. Y. .....Nov. 3-5
SAE National Fuels and Lubricants Meeting, Mayo Hotel, Tulsa, Okla. .....Nov. 4-5
International Motor Review and Motorama, Los Angeles, Calif., Nov. 5-15
Association of National Advertisers, annual meeting, Hotel Plaza, New York, N. Y. .....Nov. 8-10
American Petroleum Institute, annual meeting, Conrad Hilton Hotel and Palmer House, Chicago, Ill. .....Nov. 8-11
Industrial Tool & Equipment Show, Montreal, Canada .....Nov. 8-12
Industrial Management Society, annual Time and Motion Study clinic, Sherman Hotel, Chicago, Ill. .....Nov. 10-12
Gray Iron Founders' Society, annual meeting, Homestead, Hot Springs, Va. .....Nov. 11-12
Magnesium Association, tenth annual meeting, Hotel Chase, St. Louis, Mo. .....Nov. 15-17
American Standards Association, fifth National Conference on Standards, Hotel Roosevelt, New York, N. Y. .....Nov. 15-17
American Finance Conference, Commodore Hotel, New York, N. Y., Nov. 15-17
Pan-American Road Race, Mexico, Nov. 19-23
ASME, annual meeting, Statler Hotel, New York, N. Y..Nov. 29-Dec. 3
First International Automation Exposition, 242nd Coast Artillery Armory, New York, N. Y., Nov. 29-Dec. 3
National Standard Parts Association, annual convention, Sherman Hotel, Chicago, Ill. ....Dec. 6-7
Society of the Plastics Industry, fifth Film, Sheeting, and Coated Fabrics Div. conference, Hotel Commodore, New York, N. Y..Dec. 7-8
Automotive Service Industries Show, Navy Pier, Chicago, Ill. ...Dec. 8-10

1955

Chicago Automobile Show, Chicago, Ill. .....Jan. 8-16
SAE Golden Anniversary Annual Meeting and Engineering Display, Sheraton - Cadillac and Statler Hotels, Detroit, Mich., Jan. 10-14
Forty-Fifth Annual National Motor Boat Show, Kingsbridge Armory, New York, N. Y. .....Jan. 14-23
Plant Maintenance & Engineering Show, International Amphitheatre, Chicago, Ill. .....Jan. 24-27
National Automobile Dealers Association, annual convention, Conrad Hilton Hotel, Chicago, Ill., Jan. 29-Feb. 2
Detroit Automobile Show, Detroit, Mich. .....Jan. 29-Feb. 6
Automotive Accessories Manufacturers of America, annual exposition, Navy Pier, Chicago, Ill. .....Feb. 7-11

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CAN THE MARKEM METHOD HELP YOU?

Designing equipment for effective two color marking at production rates is just one example of how Markem solves industry's marking problems. To answer the descriptive, decorative or control marking requirements of your product, part or package, ask Markem to apply the complete Markem Method to your needs:

1. *ANALYSIS of your marking or imprinting problems*
2. *RECOMMENDATION of appropriate Markem Machine, Markem Type and Markem Ink*
3. *SERVICE in installation, instruction, maintenance and supply.*

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Markem Machine Company, Keene 8, N. H., U. S. A.

MARKEM ...TO MAKE YOUR MARK

British Commercial Vehicles

(*Continued from page* 72)

models from the big makers, including Ford, B.M.C. (comprising Austin and Morris), and Standard. Ford's Diesel is a vertical four of 220 cu in. piston displacement, governed to 2400 rpm and developing 60 hp. It is conventional direct injection, valve-in-head type, with exhaust valve inserts, rotating valves, replaceable wet liners. This unit equips the Thames two and three-ton trucks. Bedford (General Motors) uses Perkins Diesels.

The Austin-Morris groups offer two units, the smaller having a piston displacement of 132.7 cu in., bore and stroke being 3.25 by 4 in., and output 55 hp at 3500 rpm. The larger engine has a displacement of 207.5 cu in., bore and stroke being 3.74 by 4.724 in. and output 58 hp at 2400 rpm. Compression ratio is 16.5 to 1. The smaller engine has three main bearings, while the larger model has a shaft in five main bearings. Both are valve-in-head models, with direct injection into Ricardo-Comet combustion chambers. The 132.7 cu in. engine is designed for taxicabs, hire car and medium commercial work, while the larger model is offered as optional equipment in the two-three ton Austin truck.

Standard's Diesel is one developed from the power plant originally used in the Ferguson tractor, and is a four of 127.68 cu in. displacement, bore being 3-3/16, stroke 4 in., and output 40 hp at 3000 rpm. As in the case of all the others it is valve-in-head type. A feature is the use of the Freeman-Sanders combustion chamber which sets up rapid rotational movement of the air in the head and is said to promote excellent combustion characteristics.

Probably the largest Diesel engine producer in England, Perkins gets into the low power class with a vertical three cylinder model of the same general design as the larger engines, but with a displacement reduced to 144.3 cu in., and output of 41 hp at the governed speed of 2400 rpm. This is a four-bearing unit with a maximum torque of 101 lb-ft and a weight of 517 lb with electric starter, but less flywheel and starter ring. This firm also features a two-stroke gasoline engine, but states that the greater demand now is for the heavy oil engine.

Another two-stroke is the Tilling-Stevens opposed double-piston engine of 199 cu in., (3¼ by 4 in. bore and stroke) developing 105 hp at 2400 rpm. Belonging to the Rootes Group, it is used in the Commer five and seven ton trucks as an alternative to a gasoline engine and by some coach companies controlled by Rootes.

All the specialized Diesel engine manufacturers are now producing a horizontal model—these include Gardner, Meadows, and Perkins. The truck manufacturers producing their own engines have also come into line with A.E.C., Thornycroft, Daimler, Albion, and Leyland. Rear positioned engines, either transverse or longitudinal, have not met with favor in England, whereas in Continental countries they are a strong feature on coach chassis.

Distinctive by being the only "twelve" in the show was the Foden double-six, two-stroke engine. This is on the same general lines as the Foden six and consists of two parallel banks of vertical cylinders in one light alloy casting, each bank having its own Roots-type

(*Turn to page* 114, *please*)

for the automotive industry

Chrome alloy, stainless steel, bronze, Monel, K. Monel, aluminum, copper, glass, plastic, drilled balls...Hartford makes them all, and is thoroughly experienced in supplying the automotive industry. Your specifications will receive prompt attention in our Engineering Department.

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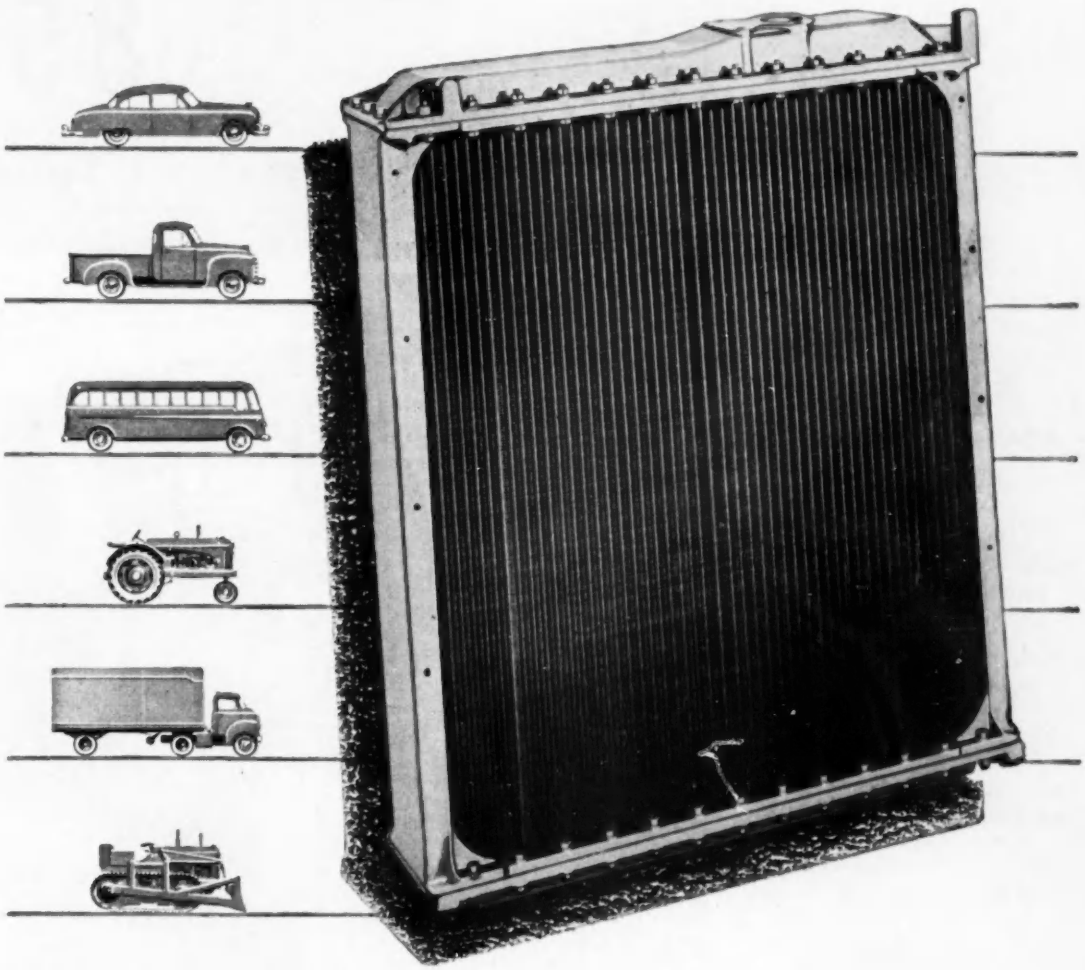

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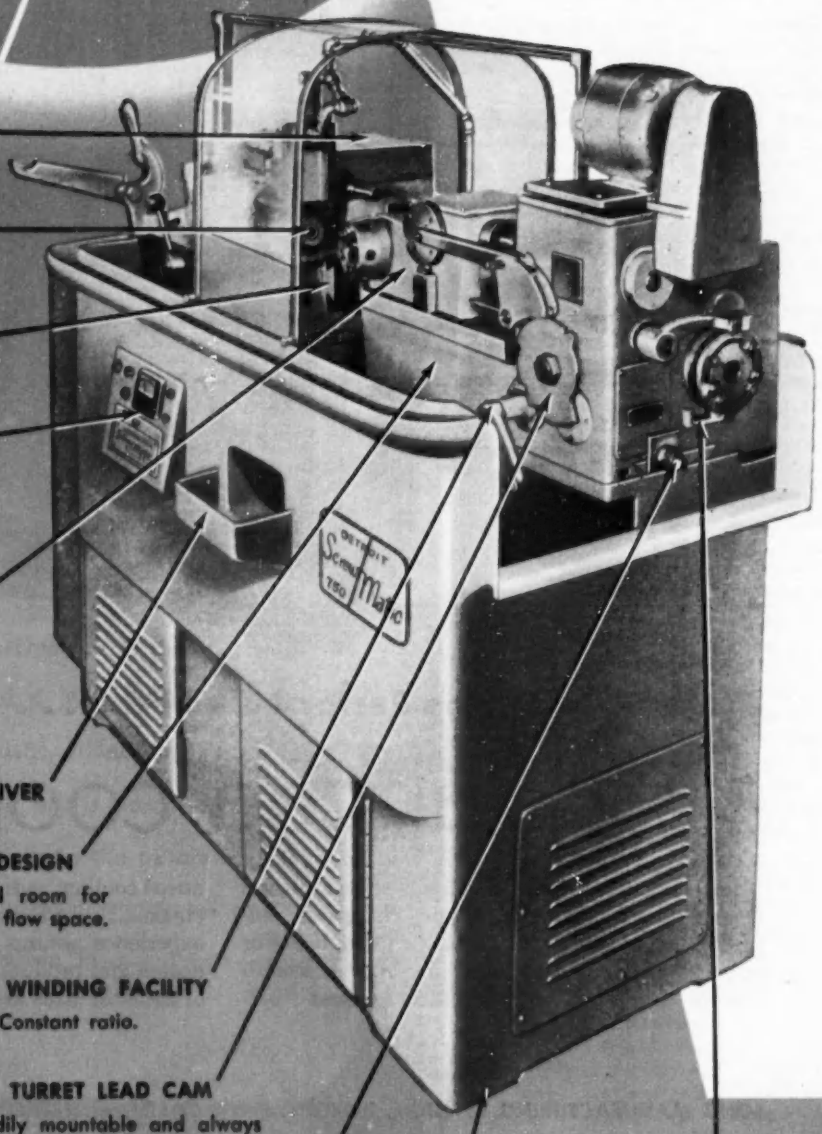
DETROIT Screw Matic 750



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WORK SPINDLE
Driven by independently supported V-belt and sheave.

CROSS SLIDES
Direct cam operated.

SPINDLE SPEED
Infinitely variable and reversible. Controlled by simple dial setting. Three preset, independent cutting speeds are conveniently adjustable during cutting.

TURRET SLIDE
Equipped with a three-position crank setting to adjust turret unit away from the spindle.

PARTS RECEIVER

OPEN FRONT DESIGN
Provides unrestricted room for turret tools and chip flow space.

HAND WINDING FACILITY
Constant ratio.

TURRET LEAD CAM
Readily mountable and always visible.

TURRET AND CAMSHAFT UNIT
Self-contained and slideable along machine bed.

OVERLOAD SAFETY DEVICE
Readily accessible position and easy to reset.

MACHINE BASE
Sturdy, one-piece, rigid cabinet. High walls give protection against oil spillage.

WORDS about a *Completely New* Screw Machine

Now, for the first time in 20 years, a new development has been made in screw machine engineering. Three new design principles have been incorporated in the Gear Grinding Machine Company's SCREWMATIC 750 that, in terms of lowered costs and increased production, make it the greatest advancement in screw machine history:

1. Infinite variable spindle speeds instead of gearing.
2. Work spindle drive through V-belts instead of roller chains.
3. Low pressure air cylinders for stock feeding instead of a constant speed backshaft.

These design elements have made possible many outstanding performance features. The SCREWMATIC 750 is now ready to give you—

Higher Work Output Because . . .

An infinitely variable spindle speed drive permits a choice of three different spindle speeds in any cycle of work. Various speeds are obtained by a simple dial setting and are adjustable during actual tool cutting. Reversibility of any of the forward speeds eliminates need of left-hand tools.

Greater Precision . . .

Through arrangement whereby the precision spindle bearings carry cutting tool pressures only. No drive members or clutch bodies are carried by the spindle proper. The precision spindle bearings are anti-friction non-adjustable standard type.

Chatterproof, accurate forming is assured by heavy section cross slides, guided on vertically arranged dovetails. Slide unit is mounted upon deep wall supports. Slides are direct cam actuated. Micrometer adjustment and concealed dead stops are provided.

A six station turret is held in precision needle bearings and locked in hardened taper bushings. This assures accuracy through perfect tool alignment with work spindle. A subbase slide guide permits ready realignment after years of service.

Tool and Cam Layout Simplified . . .

Infinitely variable spindle speeds, together with unrestricted tooling space, simplify tool and cam layout computations. Machine operators will appreciate the fully visible lead cam and setup facilities.

Outstanding Work-length Capacity . . .

A turret slide unit, including the lead cam and drive, mounted longitudinally, slides along the machine base. The unit can be positioned away from the spindle so as to permit work pieces up to 6 inches in length to be machined with turret tools. Even at such lengths, no tool crowding exists—nor are cam "cut downs" required.

This arrangement does not impair economical production of long, short, or medium length parts, for the turret slide and index stroke and speed can readily be changed to suit such parts. All work is produced in the most expedient, economical manner.

Tooling Accessibility . . . Free Chip Flow . . .

The open front design, with its high wall cabinet, permits maximum tool accessibility and tooling space. Chips flow into an ample size, deep chip well. Open ended provision permits chips to be removed from well during machining operations.

Tooling and Attachments . . .

The SCREWMATIC 750 accommodates standard collets, feed fingers, cams and tool holders. In designing the SCREWMATIC 750, special emphasis was placed on incorporating in the machine facilities to adapt readily all commonly used attachments without obstructing the accessibility to tools or the free chip flow.

Simplified Machine Versions to Suit Customer Requirements . . .

The unit design permits the SCREWMATIC 750 to be supplied in simplified forms for long run production of simple parts. The machine can be delivered without such features as variable spindle speeds and spindle reversal. The turret slide can be replaced by a plain tool slide. The spindle is then driven directly from an electric motor over V-belt sheaves.

Capacity . . .

The SCREWMATIC 750 takes bar stock up to .750 inches diameter. For heavy duty machining, standard size collets and feeders are used. The maximum standard spindle speed is 5100 r.p.m.'s. Higher speeds are available on request.

The longest lengths that can be turned with a standard 7-inch diameter cam are 2¼ inches. Longer turning lengths are obtainable with a larger diameter cam.

Cam shaft cycle speeds range from 1.8 to 240 seconds. The SCREWMATIC 750 accommodates standard turret tools with shank diameters of .750 inches.

The SCREWMATIC 750 is manufactered by The Gear Grinding Machine Co.—a company known for its accomplishments in precision, speed, and automation in the field of gear grinding . . . the company that produces the intricate Rzeppa Constant Velocity Universal Joint.

Should you wish detailed information and photographs, use the coupon below.

DETROIT Screw Matic 750

The Gear Grinding Machine Co.

3903 Christopher • Detroit 11, Michigan

We are interested in receiving more information on the new Detroit SCREWMATIC 750.

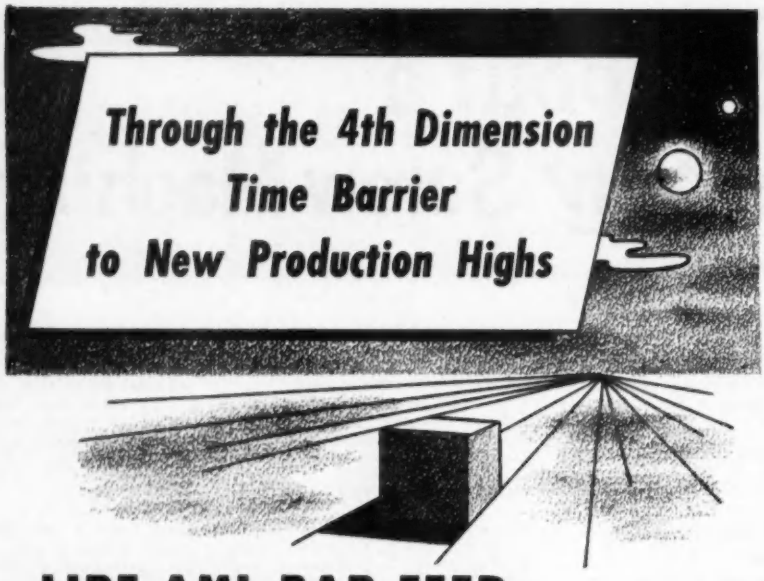
Company Name_____

Address_____

City_____ State_____

Send to the Attention of_____

Title_____



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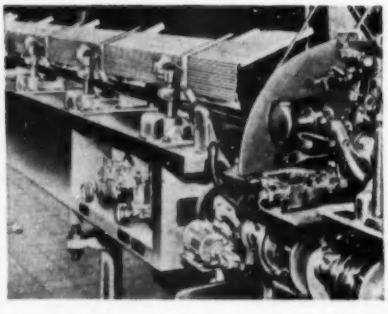

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British Commercial Vehicles

(*Continued from page* 110)

blowers, its own injection system, filters, etc. Each of the two nickel steel crankshafts is carried in seven bearings of 3 in. diameter, with crankpins of 2⅝ in. diameter, the two shafts being connected by spur gearing. Developed at the request of the British navy for use both as a propulsive unit and for generator driving, this 500 cu in. engine has a bore and stroke of 3.35 by 4.73 in. and has a constant hp rating of 210 hp at 1800 rpm. Its combat output is 300 hp at 2200 rpm. Compression ratio is 14.1, and the weight of the marine version, without gearbox, is 2700 lb. Having given good results on the water, the twelve has now been brought forth as a vehicle version, but apparently it is not yet decided whether Fodens will produce a special vehicle or will sell it for equipment in special cross-country vehicles where 200 hp can be utilized.

Two years ago a movement was apparent towards supercharging the higher powered four-stroke Diesels. This has now been extended, those making use of it being Thornycroft, Leyland, Meadows and Rolls Royce. Thornycroft fits an exhaust-driven supercharger on the 691 cu in. six cylinder engine stepping the power up from 155 to 200 hp at 1900 rpm and increasing the torque from 508 to 625 lb-ft, with an increase in weight of only 40 lb. Meadows make use of the Brown-Boverie exhaust-gas turbocharger, mounted at the rear of the engine above the flywheel housing, on an engine having a piston displacement of 970 cu in. With the blower the continuous 12 hour rating is 220 hp compared with 150 for the naturally aspired version. Leyland uses a turbo-charger on the six cylinder engine of 4.8 by 4.5 in. bore and stroke, giving 185 hp at 2000 rpm.

The Rolls Royce four cylinder unsupercharged Diesel, intended for commercial vehicle use, was shown for the first time. Dimensions are 44.5 in. length and 29 in. width. Brake horsepower of the supercharged version is 167 at 2100 rpm.

Outstanding among the new productions was a double-deck bus built by A.E.C. in conjunction with London Transport. Externally there was little to differentiate it from the two-axle, double-deck buses in service on London streets. It is laid out to carry 64 passengers with a loaded weight no

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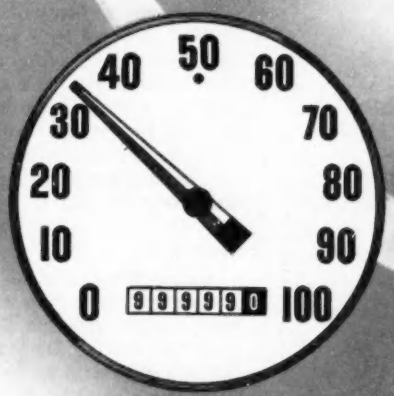

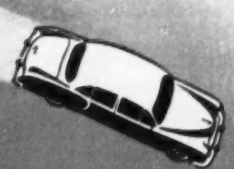

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greater than that of the present 56-passenger vehicle and will replace the present 70-passenger, three-axle trolleybuses. In order to achieve this result monocoque construction has been adopted, with the use of light alloys and a small amount of glass fiber reinforced plastic. Unladen weight is 15,064 lb and laden weight 24,640 lb. It is 27 ft long, 96 in. wide and has a wheelbase of 201 in.

The British manufacturer has a double reason for studying weight reduction. Apart from the general saving arising from the reduction of weight, the English law restricts trucks having a dead weight of more than three tons to a speed of 20 mph. If this weight is not exceeded, the speed limit is raised to 30 miles an hour, as in the case of passenger-carrying vehicles, with an overall limit of 12 tons for a two-axle vehicle. It is the practice in some cases to carry five to seven tons useful load while keeping within the three ton deadweight limit. Efforts are being made to increase this useful load to 8½ tons, thus getting very near to the 12 ton maximum, but this is only possible by light alloy construction.

Mann Egerton & Co., working in conjunction with British Aluminum Company, presented an all light-alloy platform truck, with underfloor Dennis Diesel engine, coming within the three ton weight limit and carrying a payload of 8½ tons.

The Jensen Co. showed all light-alloy chassis frame construction. This featured a quick detachable forward mounted Perkins six-cylinder Diesel which, together with its transmission, could be withdrawn on a bogey and, on replacing, was positioned by studs and then bolted to the chassis. This chassis with platform body weighed 6270 lb and carried a six ton payload. A new model was a light-alloy tractor chassis to haul a load of 6720 lb, use being made of the newly-produced B.M.C. small four cylinder Diesel developing 55 hp.

Plastic up to the present has found little application in truck and coach construction. An exception was Thornycroft who in addition to all metal bodies showed one truck with a driving cab entirely in glass fiber reinforced plastic. Apparently this move had been made more with a view to protection against heat, damp and insects than for weight reduction.

Albion introduced an epicyclic overdrive, inserted between the clutch housing and the gearbox and adding only 3⅝ in. to the overall length. With direct-drive ratio this gave a free wheel action, solid connection only being obtained on overdrive.

As a part of the program for increased exports, cross-country vehicles of the 4 x 4 and 6 x 6 type were prominent. Leyland presented the Martian six-wheel drive model for cross country operation for gross laden weights up to 23 tons. This was powered by the Leyland six-cylinder, 597 cu in. engine driving through a main gearbox with four ratios and an auxiliary box with three ratios. This featured a centrally-pivoted walking beam housing with a train of gears for the rear wheel drive.

Thornycroft featured the 6 x 6 Nubian, powered by a six-cylinder 90 hp Diesel, and having a five speed main transmission as a unit with the engine and an auxiliary transfer gearbox. Guy entered the heavy load carrying class with the Goliath series using Gardner engines, the biggest being an eight wheeler having a four-spring rear bogey and two-axle overhead worm drive.

Dennis presented a bus and an ambulance chassis having some unusual features. To get a low floor, both of these had the De Dion type of rear axle, the differential housing being bolted to a central longitudinal chassis frame member. This was the only ex-

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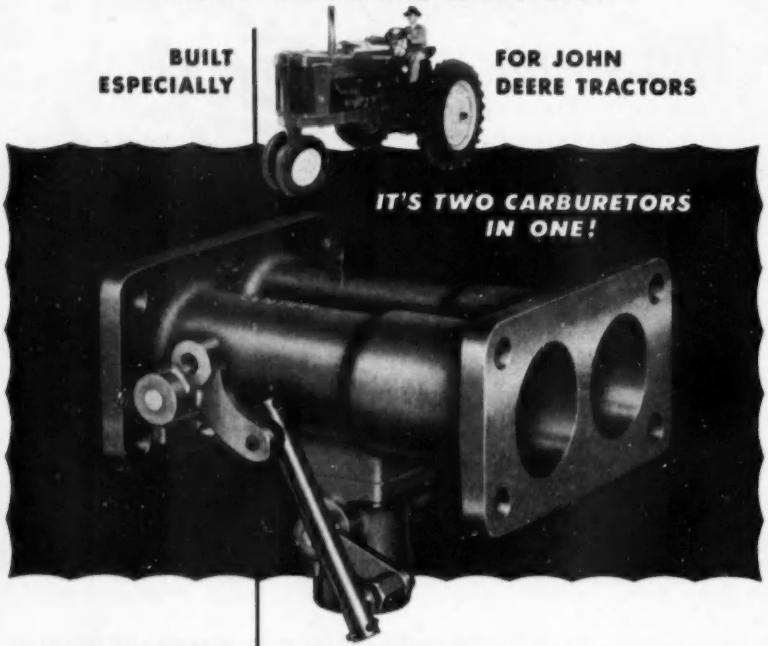

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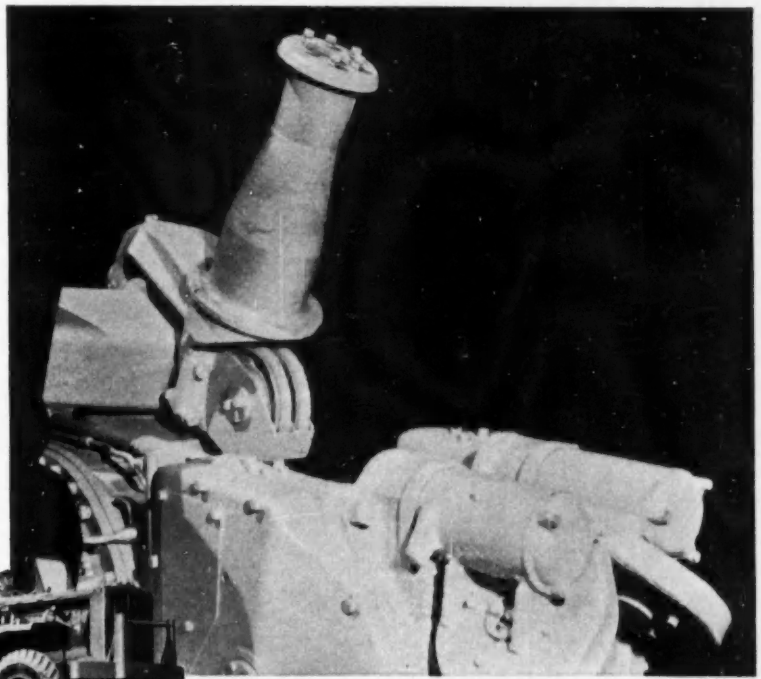
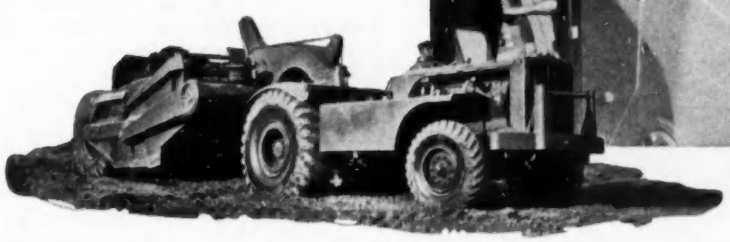


Right: This "king bolt," made of Republic Alloy Steel, serves as hitch between tractor and trailer. Below: Caterpillar Diesel DW15 Tractor and No. 15 Scraper working on road job in Colorado.



How Republic Alloy Steels Help CATERPILLAR®

Take the "king bolt." It's the link between tractor and scraper or wagon. It takes all the pull, the bumps, and the shocks when a tractor drags earth-moving or other heavy equipment over uneven ground. It has to be tough.

Caterpillar uses a specific Republic Alloy Steel for this part on its DW15 tractor. And for other parts as well, many of which are not as easy to spot. But all of which are important.

Republic has been supplying Caterpillar with alloy steels for a good portion of the 50 years that track-type machines have been roaming and moving the earth. More than this, Republic metallurgists have helped Caterpillar use these steels to best advantage.

This year is Caterpillar's 50th Anniversary in the manufacture of crawler tractors. And Republic is glad to congratulate a pioneer. You see, Republic pioneered the wide use of alloy steels. And we're still helping manufacturers use these steels profitably.

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ample of a De Dion axle for a commercial vehicle, although it is common on European passenger cars. On the coach the Dennis Lancet Diesel was mounted under the floor, but on the ambulance use was made of a four-cylinder vertical Perkins mounted in the driving cab.

Chevrolet Completely New for '55

(*Continued from page* 55)

steel-backed sintered copper-nickel matrix with an overlay of thin lead-babbitt alloy. Crankshaft thrust is taken on the flanged rear bearing.

Cylinder heads for both banks are interchangeable and incorporate a wedge-type combustion chamber. Valves are in line at a 23-deg angle to the bore axis. The large cylinder bores permit use of large valves with ample cooling. Large inlet ports permit low velocity fuel flow at high speeds. Exhaust passages point upwards and out and are extremely short to reduce heat rejection. An exhaust cross-over passage in the center of the head is tied in to a single exhaust passage.

The top surface is at an angle to the bottom face so as to locate the rocker cover as far inboard as possible. Eight reamed holes in each head provide anchorage for the individual rocker arm supports. The stiffness of the head, due to the arrangement of cored water passages, coupled with the five bolt pattern attachment at each bore, assures freedom from distortion and tight sealing on the embossed steel head gasket.

Connecting rods are short and light, and have a separately forged cap, retained by plain nuts. The piston pin is pressed-in. Precision type replaceable bearings are used at the big end.

Pistons are of Autothermic type, made of aluminum alloy, with a steel insert slipper skirt. The piston pin is offset 0.078 in. to insure quiet operation. Three rings are installed above the piston pin. The two compression rings are of thick-wall alloy iron, 5/64-in. wide, taper faced and with an inside bevel, the top ring being flash chromium-plated. The oil ring is of latest design chrome-plated steel rail type.

The valve train is completely new, featuring low inertia. Engines used with three-speed transmissions have mechanical valve lifters and low lash

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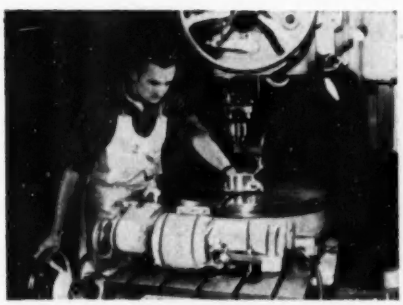
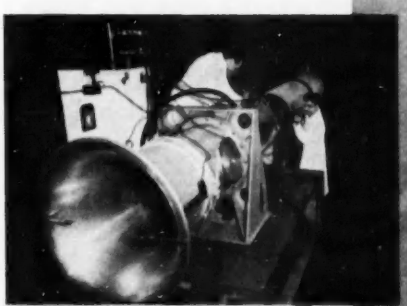
The J44 is a low-cost, easy to maintain engine capable of repeated flights and long-service-life. Its rugged construction withstands repeated launchings from ground cradles, shipboard catapults or from mother planes in the air.

Creative thinking and advanced design techniques incorporated in the J44 and other turbojets, as well as new type propulsion systems for underwater ordnance, keep the Fairchild Engine Division in the forefront of powerplant development.



Efficient production design of the J44 Turbojet requires only standard tooling—means economical production.



In actual service the J44 has demonstrated performance far in excess of original engineered service life.

Fairchild Engine specialists have years of experience in powerplant design and manufacturing.

The simplicity of the J44 construction means easy field maintenance using only standard equipment.

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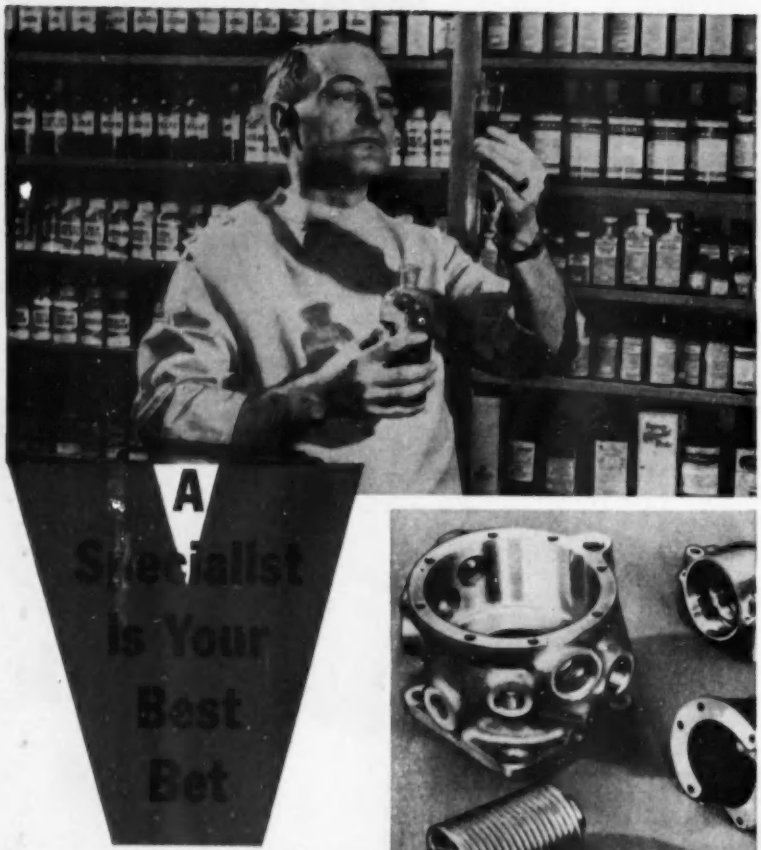

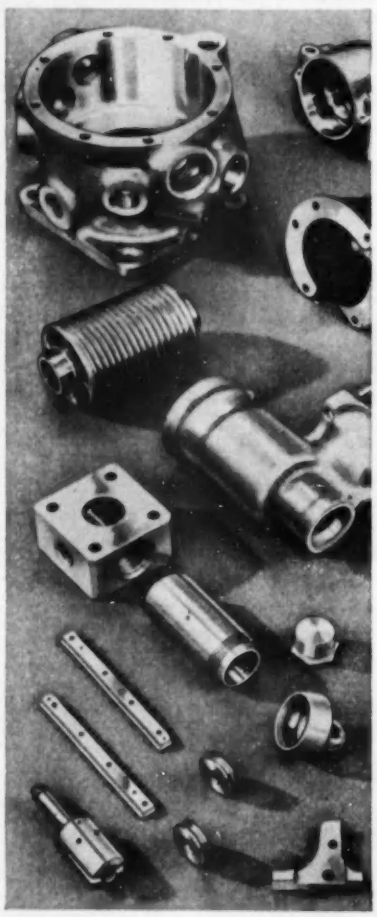

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change throughout the range. Hydraulic valve lifters are supplied in engines used with Powerglide drive. Pushrods are made of steel tubing, the gathered ends being provided with small openings for the passage of lubricant.

A distinctive feature of this engine is the elimination of the usual rocker arm shaft and its supports. Instead, Chevrolet employs individually mounted rocker arms made of pressed steel, with a spherical surface for the fulcrum having an oval shaped hole punched in the bottom. Studs, threaded at their upper end, are pressed into the reamed holes in the head. Each rocker arm is assembled over the valve stem and pushrod, retained by a hollow half-ball, nut, and lock screw. Valve lash adjustment, required only with mechanical lifters, is made by turning the nut.

All valves are fitted with a shield under valve spring caps to keep excess oil from the valve stems. Exhaust valves have aluminum-dipped seats to prevent burning. Removable valve guides have been eliminated, valve stems now operating in bores in the parent metal, thereby reducing valve temperature through increased heat transfer.

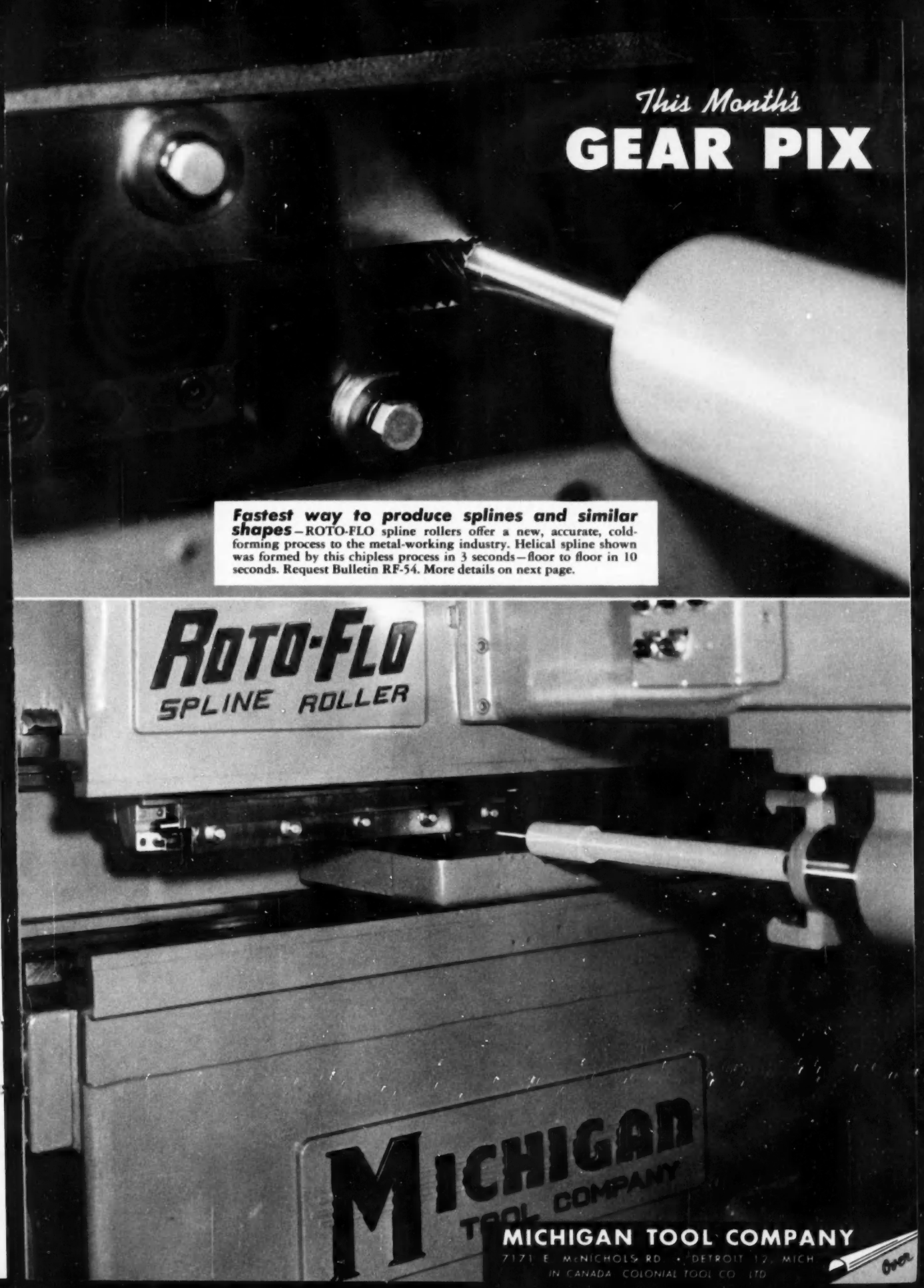
The intake manifold serves a multiple function, containing the crossover for exhaust heat to the carburetor, including the thermostat housing and coolant outlet to the radiator, and forming a closure for the V between the cylinder blocks. Intake manifold passages are designed for good distribution to each cylinder with passages of nearly equal length. Lateral branches turn abruptly from the longitudinal passages to maintain high mixture velocity at the turns.

The exhaust system consists of an exhaust manifold on each side, and an external cross-under pipe joining the two manifolds to a single exhaust pipe, muffler, and tail pipe. Exhaust manifolds also are connected by an exhaust passage through the center of the intake manifold, to provide heat under the carburetor riser for fast warm-up. The external exhaust pipe crosses below the front of the engine where it is exposed to the air stream to reduce under-hood temperature.

A heat stove is cast into the right hand exhaust manifold to supply heat to the carburetor choke housing. It consists of an outer and inner cover to provide a dead air space, and a tube leading from the chamber to the choke housing.

An exhaust manifold heat valve,

(*Turn to page* 123, *please*)



Fastest way to produce splines and similar shapes – ROTO-FLO spline rollers offer a new, accurate, cold-forming process to the metal-working industry. Helical spline shown was formed by this chipless process in 3 seconds – floor to floor in 10 seconds. Request Bulletin RF-54. More details on next page.

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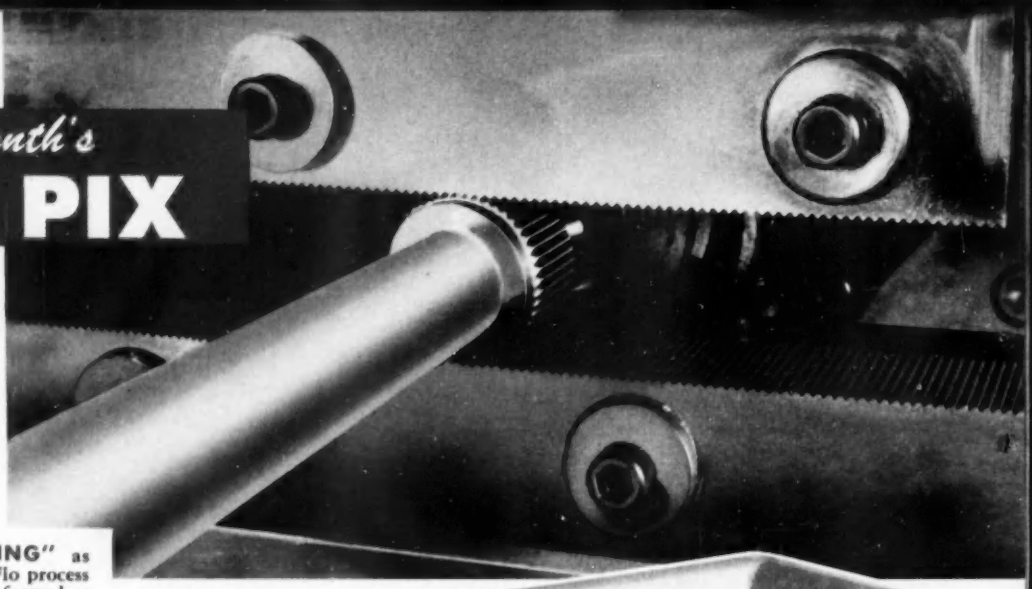
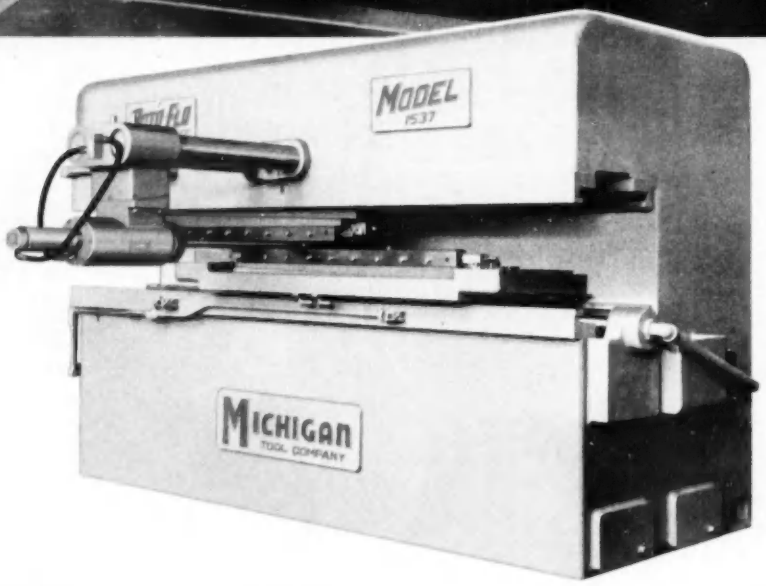
over

This Month's

GEAR PIX



"CHIPLESS MACHINING" as accomplished by the Roto-Flo process —a straight spline is being formed as it is rolled between the two forming racks. Roto-Flo produced parts have excellent surface finishes and are formed to close dimensional tolerances.



ONE of the standard models offered in the *Roto-Flo line is the 1537 with a capacity for rolling parts up to 2 inches in diameter. The stroke on these machines is variable, depending upon the size of the forming rack required for the part being produced.

SPLINES and other "tooth" forms, can be formed in a very few seconds by the Roto-Flo process, at a marked reduction in cost. As illustrated, this latest development by Michigan Tool Company in "chipless machining" presents designers with a new range of flexibility when specifying splines, serrations, and other similar shapes on external parts.

*Patent Pending

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IN CANADA: COLONIAL TOOL CO. LTD. WINDSOR, ONT.

1955 Chevrolet

(*Continued from page* 120)

thermostatically controlled, routes exhaust gases to the intake manifold risers. The valve counterweight also serves as a shield for the thermostat.

A two-barrel downdraft carburetor with automatic choke is supplied on the V-8 engine. Although carburetors for conventional and automatic transmissions are not interchangeable, they are substantially the same. Carburetor design is of offset bowl type with the bowl toward the front. It has a vacuum-operated power system and a vented type accelerating pump plunger.

The cooling system, designed for high efficiency, features complete jacketing for the cylinder barrels, extending full length and completely around the bore. Coolant is circulated by a low speed, high capacity water pump, discharged from the pump into a plenum chamber and distributed to each bank. Coolant is circulated through the block, then upward into the cylinder heads, flows from a passage at the front of the heads into passages in the intake manifold, then returns to the radiator. The centrifugal type pump is bolted to the front of the block, the housing including the plenum chamber with two outlets mentioned earlier.

The crankcase ventilation system is of road draft type.

Full pressure lubrication is featured in this engine, the system being fully contained and without external plumbing. The gear type oil pump, attached to the rear main bearing cap, is driven through a shaft from the distributor. A recirculating by-

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WITH A

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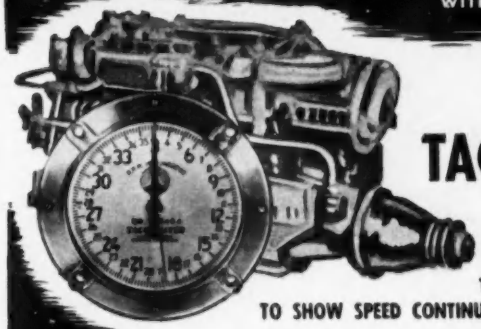

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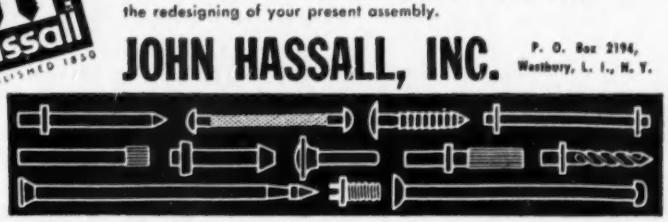


pass type pressure regulator is integral with the pump cover. Oil pick-up is through a floating strainer. Oil pressure to the valve lifter galleries is lower than in the main gallery. Each tappet, whether mechanical or hydraulic, has an annulus to facilitate oil distribution over the length of the gallery, regardless of the position of the tappet. Oil flows out the top of the tappets, through the hollow push-rods, into the cavity of the rocker arm to lubricate the rocker arm fulcrum ball and valve stem.

It is doubtless of interest to find that the new V-8 requires only four quarts of oil.

Among miscellaneous items of general interest are the following: the rear axle has greater torque capacity and improved oil sealing; the area of the clutch disk for manual shifting cars has been enlarged by 20 per cent for greater durability. Chevrolet's all-weather air conditioner will be available only with V-8's, as an option, the entire mechanism being mounted under the hood and instrument panel. Cooled air is blown into the passenger compartment from nozzles at the ends of the instrument panel. Features of this Frigidaire unit are an axial compressor and provision for heating as well as cooling of the air.

Electric windshield wipers are offered as optional equipment. Electric window power lifts for all four windows and electric seat adjuster are available as optional equipment on Two-Ten and Bel Air models.

Chevrolet has suspended brake pedals for 1955, mounted in nylon bushings which do not require lubrication. Power brakes are offered as optional.

High-air ventilation is a new feature, comprising an arch-shaped plenum chamber that channels fresh air from an external slotted cowl vent. Cowl-installed and extended to the frame on each side, it also serves as a structural brace.

Olds Installing Filter Inside Gasoline Tanks

A plastic filter, mounted in the gas tank, which is said to eliminate freezing of gasoline lines has been adopted by Oldsmobile. Measuring 4⅜ in. by 13/16 in., the cylinder strains out dirt and other particles which might accidentally get into the tank. Since the plastic cylinder has a low moisture absorption rate, it reportedly prevents water vapor from entering the lines.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, AND CIRCULATION REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (Title 39, United States Code, Section 233)

Of AUTOMOTIVE INDUSTRIES, published semi-monthly at Philadelphia 39, Pa., for October 1, 1954.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, G. C. Buzby, East Sunset Avenue, Chestnut Hill, Philadelphia 18, Pa. Editor, James R. Custer, 303 Hampden Road, Upper Darby, Pa. Managing editor, None. Business manager, G. C. Buzby, East Sunset Avenue, Chestnut Hill, Philadelphia 18, Pa.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual member, must be given.) Chilton Company, Chestnut & 56th Sts., Philadelphia 39, Pa.

Holders of more than 1 per cent of the capital stock outstanding of Chilton Company: Mary M. Acton, 260 Sycamore Avenue, Merion Station, Pa.; Mrs. Beulah Fahrendorf, 59 Drake Road, Scarsdale, New York; Dorothy S. Johnson, 1115 Fifth Avenue, New York, N. Y.; Mabel M. Musselman, 260 Sycamore Avenue, Merion Station, Pa.; J. Howard Pew, 1608 Walnut Street, Philadelphia, Pa.; J. N. Pew, Jr., 1608 Walnut Street, Philadelphia, Pa.; Mabel P. Myrin, 1608 Walnut Street, Philadelphia, Pa.; Mary Ethel Pew, 1608 Walnut Street, Philadelphia, Pa.; Tradesmans Land Title Bank & Trust Company, 100 S. Broad Street, Philadelphia, Pa., Trustee Estate of James Artman, Deceased.—Beneficiaries: Franklin Artman, Vera Watters, Alvin C. Artman, Elizabeth J. Artman, Marion A. Pratt, George H. Pratt, by assignment, Edwin Moll, by assignment. Alberta C. Sly, Executrix u-w of Frederick S. Sly, Deceased, 149-40 35th Avenue, Flushing, Long Island, N. Y.—Beneficiaries: Albert C. Sly, Alberta C. Sly and John E. Sly; Mabel M. Musselman, Mary M. Acton and John Blair Moffett, Trustees u-w of Clarence A. Musselman, Deceased, 1608 Walnut Street, Philadelphia, Pa.—Beneficiaries: Mabel M. Musselman, Mary M. Acton and David Acton; Charlotte M. Terhune, 160 E. 48th Street, New York.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required from daily, weekly, semiweekly, and triweekly newspapers only.)

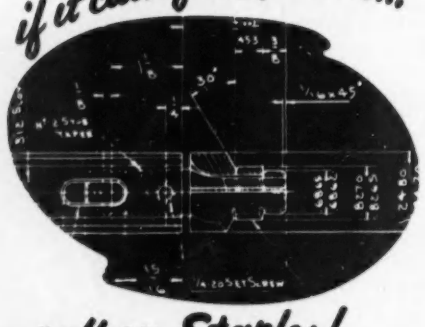
G. C. BUZBY, *Publisher*

Sworn to and subscribed before me this 13th day of September, 1954.

PHILIP J. SHIRE, JR.

(My commission expires January 7, 1955.)

[SEAL]



Turn troublesome, costly "special" hole production jobs into smooth-running, high-performance operations by taking your problems to Staples Special Tool Design and Engineering Service.

Leaders in the field of circular carbide-tipped tool manufacturing, Staples' expert tool engineers can meet your most rigid specifications with special tool designs that will speed your production and deliver precision results, while reducing your tooling costs.

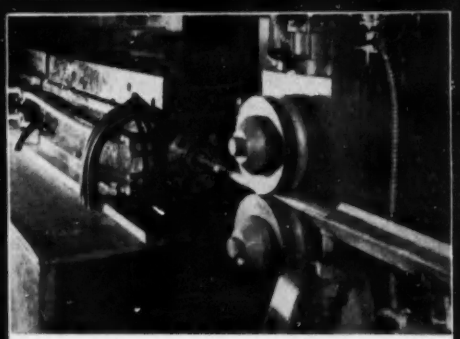
A brief description of your job requirements will bring a prompt response.

THE STAPLES TOOL COMPANY, Cincinnati 25, Ohio

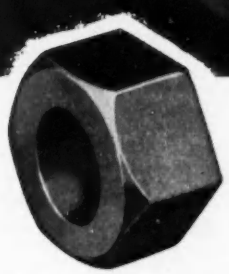
Staples CARBIDE-TIPPED CUTTING TOOLS

A complete line of Standard Circular Carbide-Tipped Tools, Expansion Reamers

4200 Nut Blanks Per Hour



Feed rolls push barstock through TOCCO Induction Coils to heat stock to 2350°F for forging.



with TOCCO* Induction Heating

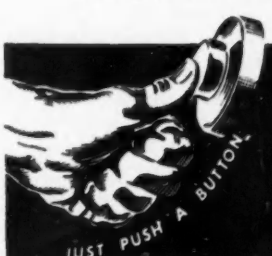
FASTER PRODUCTION—4200 nut blanks per hour—twice the output of a conventional hot punching machine—that's the result of Lamson & Sessions Company's new automatic production set up with TOCCO Induction Heating.

OTHER ADVANTAGES—TOCCO delivers exact temperatures (2350°F, plus or minus 25°) and delivers them so fast that scale has little time to form. Scale loss has been reduced to only about 1% for hot-rolled stock. TOCCO is clean and cool, fits right into the production line—no hauling to and from the heat-treat department—no unpleasant radiant heat to annoy workers.

HERE'S HOW IT WORKS—Steel bars up to 1½" diameter are fed through TOCCO Induction Coils. The first two coils, operating off a 300 kw, three kc TOCCO motor-generator set, preheat the rod. The third coil which operates from a TOCCO 250 kw 10 kc generator then boosts the rod to forging temperature. The hot rod then is fed to the special hot nut former (designed and built by NATIONAL MACHINERY CO.) which shears the rod to suitable lengths, forms the part and spits out the nut blank—ready for tapping.

In your search to find sound methods of increasing production, improving products and lowering costs, don't overlook TOCCO Induction Heating. If your products require heat treating, soldering, brazing or forging, it will pay you to investigate TOCCO for better, faster ways of producing them at lower unit costs.

THE OHIO CRANKSHAFT COMPANY



TOCCO

Mail Coupon Today

FREE BULLETIN ➡ THE OHIO CRANKSHAFT CO.
Dept. H-11, Cleveland 1, Ohio

Please send copy of "Typical Results of TOCCO Induction Heating for Forging."

Name_____

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Company_____

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SOLA-FLEX®
AIRCRAFT BELLOWS
Make Solar your source for bellows and pneumatic ducting systems
FOR AIRCRAFT BELLOWS, hot air ducting components or complete pneumatic systems, Solar is your logical supplier.
Sola-Flex bellows are known for their reliability. Over one million have been built, for a variety of airborne applications. Standard types are available "off the shelf" . . . special designs take a little longer.
Solar-made hot air ducting components are used on many of America's military and commercial aircraft. Solar's long experience in fabricating alloy steels is an important plus-factor in producing finer systems.
Solar is an integrated source for all your pneumatic system requirements—both experimental and production. Experienced Solar engineers are ready to work with you at any stage in developing complete aircraft ducting systems.
SOLAR
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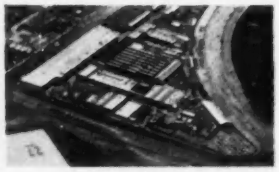
SAN DIEGO
DES MOINES

This is What Solar Offers You

Solar specializes in the manufacture of precision products from alloys and special metals for severe service. Solar's experience since 1927 is unduplicated in this field. Solar skills and facilities range from research, design and development through to mass production. Wherever heat, corrosion or difficult specifications are problems, Solar can help you solve them.



PLANTS. *In San Diego (Photo above) and Des Moines. A total of 1,400,900 sq. ft. floor space. Approximately 5,000 employees. Annual sales over $65,000,000.*

EQUIPMENT. *Production equipment for all types of metal fabrication —forming, machining, welding, brazing, casting, coating. Extensive laboratory and testing equipment. Facilities for development, prototype, limited or mass production.*

SERVICES. *Research, design, development, tooling and production engineering staffs. Experienced with all alloy steels, stainless alloys, super alloys, and titanium and its alloys. Government source inspection and Solar quality control meet rigid aircraft and commercial standards.*

CONTRACT PRODUCTION

Current orders include aircraft engine and airframe parts, alloy castings, pneumatic ducting, atomic energy components. Customers include some of the most honored names among aircraft and industrial companies in the U.S. and Europe.

SPECIAL PRODUCTS

Bellows. *"Sola-Flex"® bellows and expansion joints in many designs from ½ in. up to the world's largest, 28 ft. in diameter.*

Gas Turbines. *Solar "Mars" 50 hp engines for auxiliary generator sets, ground carts, portable fire pumps; Solar "Jupiter" 500 hp engines in variable and constant speed models.*

Ceramic Coatings. *"Solaramic"® is the Solar trade mark for a family of coatings that protects metals from heat, corrosion, galling and abrasion.*

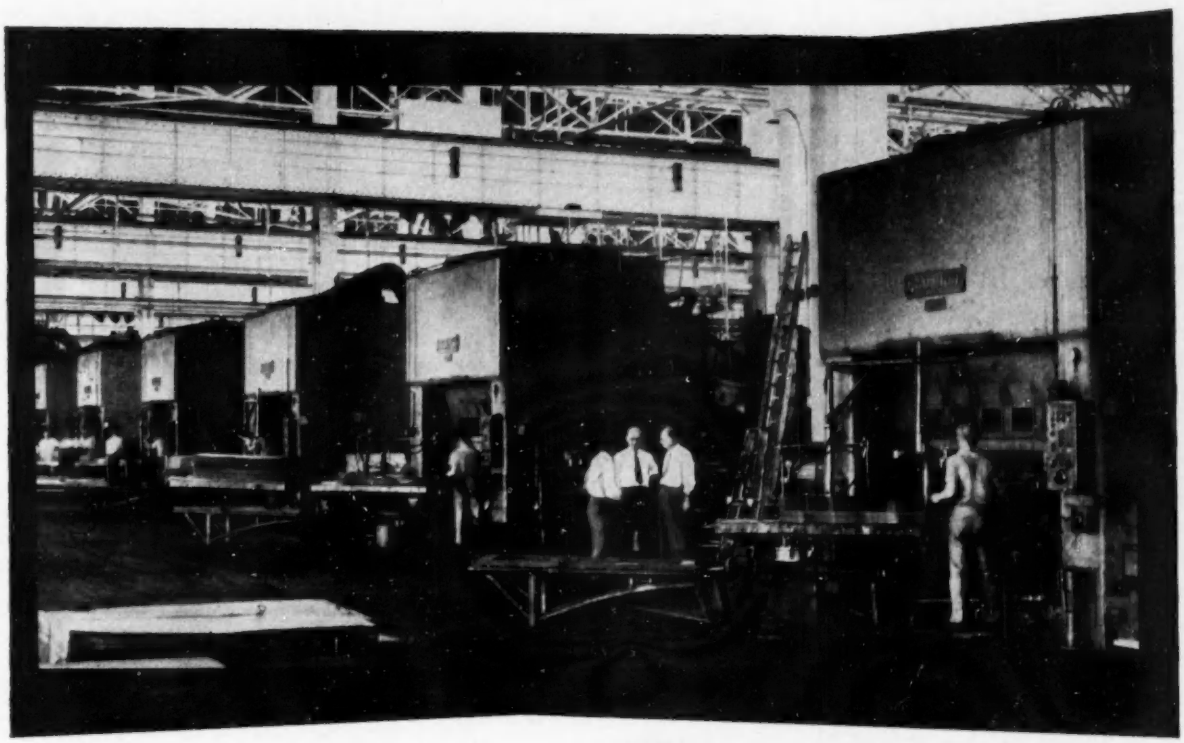
Controls. *Complete control systems utilizing the new Solar "Microjet"® principle for control of gas turbines, jet engines and pneumatic devices.*

FURTHER INFORMATION
Your inquiry regarding any Solar service or facility will receive prompt attention. Address Solar Aircraft Company, Department A-39, San Diego 12, California.

HAMILTON

TRIPLE and DOUBLE ACTION PRESSES

head more than three-quarters
of the master production lines in the
largest auto-body stamping plants



BALDWIN · BLH · LIMA-HAMILTON

HAMILTON PRESS DIVISION
Curtis Building, Detroit 2, Mich.
Branch Offices: New York, Chicago
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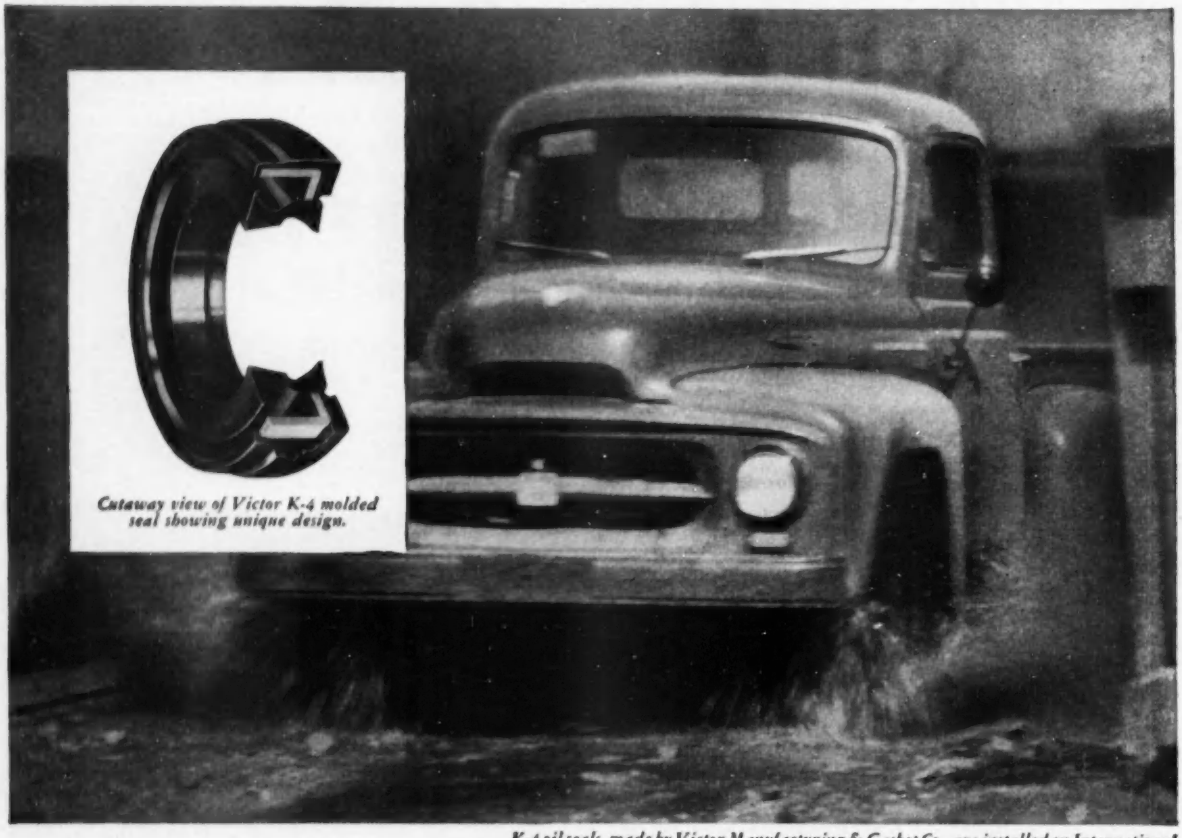
BALDWIN-LIMA-HAMILTON

Another new development using

B. F. Goodrich Chemical *raw materials*



Cutaway view of Victor K-4 molded seal showing unique design.

K-4 oil seals, made by Victor Manufacturing & Gasket Co., are installed on International Harvester trucks. B. F. Goodrich Chemical Company supplies only the Hycar rubber.

TRUCK SLOSHES THROUGH WATER SAFELY ...with Hycar bearing seals

THIS truck's front wheel bearings are fully protected from the water and dirt of this big puddle by seals made of Hycar rubber. And just as vital a function—the Hycar bearing seals keep grease in!

This double protection means double savings. These Victor seals made of Hycar assure the long life and efficiency of the wheel bearings. Costly repairs are eliminated because the bearings cannot run dry and foreign matter cannot score their highly polished surfaces.

Hycar rubber is used in many sealing applications — for trucks, passenger cars, tractors and home appliances. Hycar is highly resistant to abrasion and maintains a tight seal under severe operating conditions and a wide temperature range.

Parts made of Hycar can be molded to close tolerances. And—Hycar's resistance to oil, grease and most chemicals makes it ideal for many uses in many industries.

Perhaps Hycar can solve a problem for you—do a job that you thought couldn't be done. We'll help you find the answers—give you technical advice. For information, please write Dept. GR-6, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

B. F. Goodrich Chemical Company
A Division of The B. F. Goodrich Company

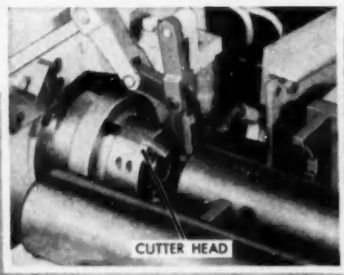
Hycar
American Rubber

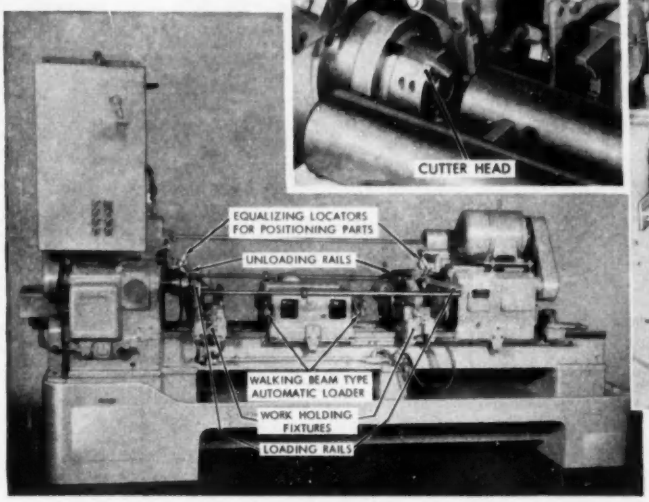
GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON colors

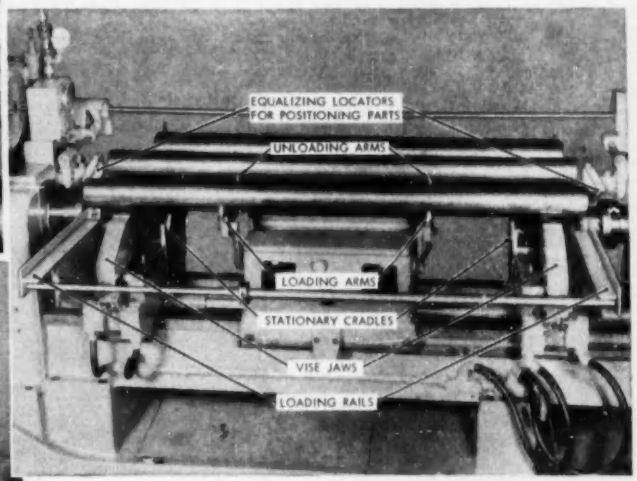
MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

Close-up view of one machining head ▶







MODEL CS Lo-swing FACING AND CHAMFERING MACHINE HANDLES AND FINISHES BOTH ENDS OF TUBING AUTOMATICALLY

PROBLEM: To automatically load and unload Propeller Shaft Tubes, face to length and chamfer inside and outside diameters of both ends simultaneously.

SOLUTION: The Model CS Lo-swing selected for this job was equipped with a special Automatic Handling Mechanism and special vises, as shown above. A close-up view of the working area of the machine with a rough tube clamped in the vise jaws and finished tubes leaving the machine on the conveyor rails at the rear is shown at the right.

The tubes arrive at the machine by conveyor and roll down to a fixed stop on the loading rails. At the end of the machine cycle, the cutter heads retract and the vises open, allowing the finished part to drop into a stationary cradle, which is positioned slightly lower than the center line of the vise jaws. An electrical contact then starts the work carrier motor imparting a rotating movement to the work carrier arms which handle a rough and finished piece simultaneously.

The unloading arms remove the finished piece, depositing it on the conveyor rails leaving the machine, while the loader arms, in their trajectory, pick up a rough part and lower it into the stationary cradle for automatic positioning by the equalizing locators. These locators assure removal of an equal amount of material from both ends of the tubes. The vise jaws close automatically as soon as the tube is correctly positioned. The machine starting clutch is then automatically engaged and the part faced to length and chamfered on both ends. Since the entire operation is automatic, no operator is required.

Seneca Falls engineers are at your disposal to assist in solving your AUTOMATION problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH Lo-swing

Tests for Determining Mechanical Properties of Alloy Steels

This is the sixth of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many in this field, including men of broad experience who may find it useful to review fundamentals from time to time.

The types of tests used to evaluate the mechanical properties of an alloy steel depend upon the end use of the steel involved. Generally speaking, mechanical properties are determined by tension, bend, and hardness tests, and by a group of special tests employed on tubular and wire products. These are discussed briefly in the following paragraphs.

(1) Tension tests provide means of determining tensile strength, yield point, yield strength, proof stress, proportional limit, per cent elongation, and per cent reduction of area. This sort of test subjects the steel to stresses resulting from the application of an axial tensile load to the specimen ends, the load being sufficient to rupture the specimen.

(2) Bend tests often aid in determining the ductility of steel. The severity of such a test depends largely upon the bending radius used. Several factors influence the length of radius, including thickness of the test specimen, width of test specimen, direction of test, chemical composition, tensile strength of specimen, etc.

(3) Hardness tests determine the steel's resistance to penetration. This characteristic is most commonly measured by the Brinell Test or the Rockwell Test. In the former, pressure is applied to the surface of a test specimen by means of a ball 10 mm in diameter. Two diameters of the resulting impression are measured and averaged, the average being used to determine the hardness number by means of a conversion table. In the Rockwell Test, the degree of hardness is read on a gage; hardness is measured by the penetration of a diamond point or a $^1/_{16}$-in. steel ball. Rockwell "C" scale readings are used in connection with the diamond point; "B" scale in connection with the steel ball. The "C" and "B" are the most commonly used of the several Rockwell scales.

(4) Special additional tests are often made on tubular and wire products. These include such items as hydrostatic and manipulating tests, and torsion and wrapping tests, the latter two being used only with wire.

The subject of testing and its relationships to the end uses of alloy steels has been given broad study by Bethlehem metallurgists. If you desire, they will be glad to discuss any phase of it with you, and also give unbiased opinions on such matters as analysis, proper selection of steels, machinability, etc. Call for their services at any time.

And when in the market for alloy steels, remember that Bethlehem can furnish the entire range of AISI standard analyses, as well as special-analysis steels and all carbon grades. Your inquiries will be welcomed.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM ALLOY STEELS

BETHLEHEM STEEL

VAN HUFFEL COLD FORMED METAL

SHAPES

improve your

PAY DIRT

These odd shapes you see in the above picture show corn farming at its best—are proven way the farmer can increase and improve his land and increase his yield without adding power or manpower. Another way is through the use of more and better implements at lower cost. That's where you come in.

Making odd shapes in metal that definitely cut farm equipment production costs and inspire revolutionary design thinking is where we come in. Whether it's something you are now making or just a drawing board dream, transforming "shapes" of metal into shapes of metal has been a proven production technique of Van Huffel for over half a century.

With hundreds of case history applications showing down to earth production economies, we would like the opportunity of demonstrating how Van Huffel shapes can help increase your pay dirt.

Write today for free portfolio of cost reducing ideas that have taken shape in the farm equipment field.

Van Huffel

TUBE CORPORATION · WARREN, OHIO

Where ideas take shape for makers of farm equipment

For ROUGH TOUGH HARD going

Milsco MILWAUKEE

SENIOR CONTOUR NO. 1893

Cushion Seats

MILSCO BRINGS YOU NEWEST ADVANTAGES IN SEATING COMFORT AND DURABILITY

COMMANDER NO. 1144

With or Without Fore and Aft Attachment

Improved driver-comfort is one of today's major engineering objectives . . . and Milsco can help you to step up the man-work-factor of your equipment with job-fitted cushion seating. Milsco Cushion Seats are the developments of years of experience in designing and manufacturing heavy duty cushion seats for all types of mobile equipment. Our field studies of enduring cushioning materials and contour body support may prove of important value to you. Write us about your seating problem now.

Sold Only to Original Equipment Manufacturers

ESTABLISHED 1924

Milsco MILWAUKEE

MILSCO MANUFACTURING CO.
2730 N. 33rd ST., MILWAUKEE 45, WIS.

A.C.M.I. BORESCOPES

for close-up visual inspection of internal surfaces and hidden parts

A.C.M.I. Borescopes are available in 4 angles of vision (as above)—in diameters of .120" to 4.00"—in lengths of 4" to 720". Special models for special problems.

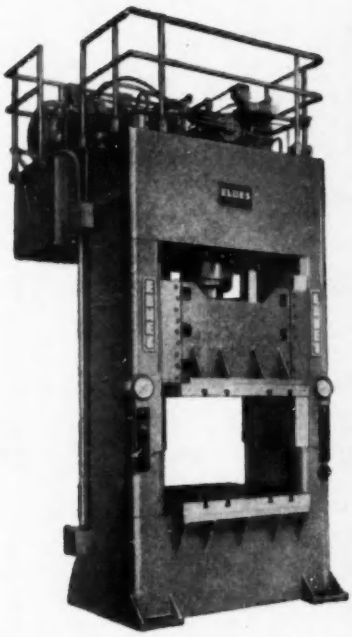
A.C.M.I. Borescopes permit close-up visual examination of interior areas and surfaces not otherwise visible. They save time and money, and prevent costly dismantling.• Each Borescope is a compact, self-illuminated industrial telescope of highest quality, employing a precision optical system, that produces a flat visual field. Lens systems are fully corrected for color, spherical aberrations, and coma, with all lens surfaces coated to increase light transmission

Write for free informational folder, or tell us your problem.

American Cystoscope Makers, Inc.
1241 LAFAYETTE AVENUE NEW YORK 59, N. Y.

AUTOMOTIVE INDUSTRIES

is read by general executives, production men, engineers, purchasing agents and others whose o.k. means orders for those who sell to the World's Largest Manufacturing Industry.



DRAWING AND FORMING PRESS

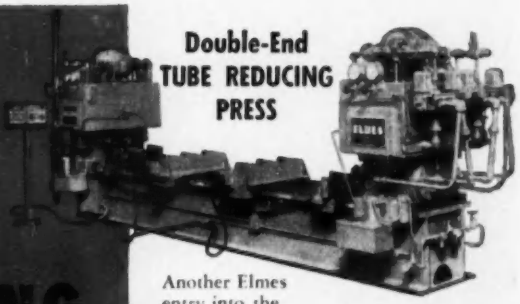
Typical of Elmes soundly designed and constructed hydraulic equipment for metal drawing and forming is the press shown above. These presses are built in single and double-action types (with or without cushion) and in triple-action type. Equipped with push-button controls arranged for semi-automatic or full automatic operation, and inching for die-setting. Rapid traverse to and from work, automatic slow-down, and protection against over-travel and over-pressure. Wide range of pressure capacities, from 50 to 2000 tons or more.

Elmes versatility in the metalworking field is illustrated by the presses shown here—just a few of the many types available. Whatever your job requirements, skilled Elmes engineers are ready at all times to help you solve your hydraulic equipment problems on the traditional Elmes basis of maximum production efficiency at minimum cost.

If it's **METAL WORKING**

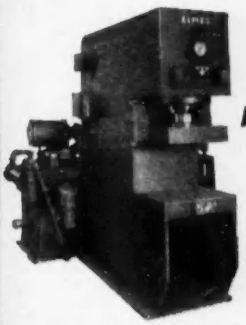
YOU'LL DO IT *better...faster... at lower cost*

ON AN **ELMES** *hydraulic press*



Double-End TUBE REDUCING PRESS

Another Elmes entry into the growing field of *automation*. Fully automatic, including feed, tube ejection, and take-away, and lubrication of tube ends prior to reduction. Press illustrated is designed to accommodate a wide range of tubing lengths.



AUTOMATIC OPENSIDE PRESS

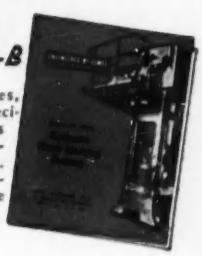
This specially designed press accomplishes in a single stroke the shearing, riveting, and straightening of forged steel work of variable thicknesses. Openside presses available in standard and special designs.

HOBBING PRESS

For die-sinking and hobbing — forming duplicate die inserts, multi-cavity molds, and single molds with unusual contours. Capacities to 5000 tons.

Write for Bulletin 1010-B

Illustrates, describes, and gives major specifications on Elmes Hydraulic Metal-Working Presses. See your Elmes Distributor — or write to us direct.



DISTRIBUTORS IN PRINCIPAL INDUSTRIAL CENTERS

AMERICAN STEEL FOUNDRIES

ELMES ENGINEERING DIVISION

hydraulic presses and equipment .... 1173 TENNESSEE AVE., CINCINNATI 29, OHIO

Use TUTHILL SPRINGS
designed for the job!

FINEST ALLOY STEEL LEAF AND HELPER SPRINGS

Solving unusual spring and load problems is a 74-year-old success story at TUTHILL. Since 1880, we've been designing and making dependable, alloy-steel springs for cars, trucks, fire-fighters, trailers, multiple-axle jobs, dump trucks, jeeps. Whatever your need, call upon TUTHILL's top caliber skills and materials to provide the right springs — built for your job.

TUTHILL SPRING CO.
760 West Polk Street Chicago 7, Illinois

Multiform STEEL RULE Dies
STEEL RULE SINCE 1900

LET US SOLVE YOUR
DIE-CUTTING PROBLEMS
WITH RICHARDS' "TOUGH TEMPER"
STEEL RULE CUTTING DIES

HEADQUARTERS SINCE 1900
FOR DIES AND DIE MAKING
EQUIPMENT AND SUPPLIES

(Punches, Die Boards, Cutting Rule, Eject. Rubber)

FOR AUTOMOTIVE, AIRPLANE, RUBBER,
FELT, INSULATION, SEATING, CORK,
GASKET, TAR BOARD, PLASTICS, ETC.

J. A. RICHARDS CO. 903 N. PITCHER KALAMAZOO, MICH.

G&O Radiators
39th Year

ENGINE COOLING RADIATORS
•
HEATERS
•
OIL COOLERS
•

THE G & O MANUFACTURING CO.
NEW HAVEN CONNECTICUT

Safety CONTROLS
FOR ENGINES
SYNCHRO-START PRODUCTS, INC.
8151 N. RIDGEWAY AVE., SKOKIE, ILLINOIS
See our full page "ad" in the STATISTICAL ISSUE p. 399

PIPE and AUTOMOTIVE PLUGS and FITTINGS
Ferrous & Non-Ferrous
PITTSBURGH PLUG AND PRODUCTS CO.
Pittsburgh 15, Pa. • • • Evans City, Pa.

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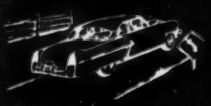
WESTERN FELT WORKS
4021-4139 W. Ogden Ave., Chicago 23, Ill.
Offices in Principal Cities
Rolls, sheets, cut and treated parts. Wool felts manufactured and cut to closest specifications. Also felt impregnated and coated with synthetic rubbers, resins, asphalt, etc.

TRACK SUPPLIES RAILS
BUILDERS
New RAILS Relaying
SPECIAL OFFER
50 NET TON 12# A.S.C.E. NEW RAILS
100 NET TON 25# A.S.C.E. NEW RAILS
500 NET TON 90# A.S.C.E. RELAYERS
COMPLETE COMPLEMENT OF JOINT BARS FOR EACH SECTION—SEND US YOUR INQUIRIES
Steel Supply Co.
UIson 2-6000
4201 WYOMING AVE • P.O.BOX 180 • DEARBORN, MICH.

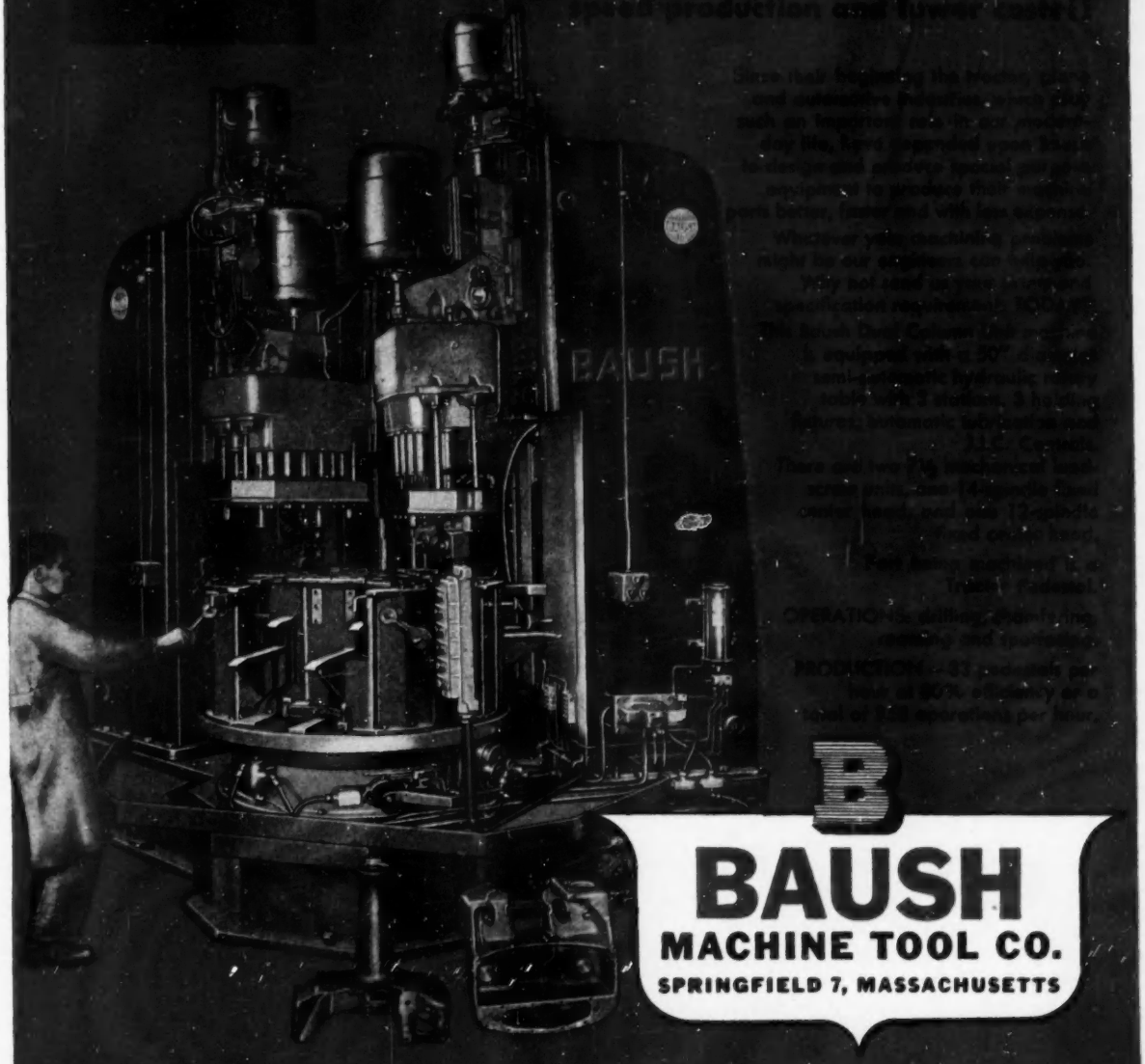


Whether -

TRACTORS
PLANES
or AUTOS---

Baush Automatic Machine Tools speed production and lower costs!

Since that historic day when the Wright Brothers and automotive pioneers first built such an important part in our modern day life, have depended upon Baush to design and manufacture special machine tools equipped to produce their engine parts faster, better and with less scrap. Whatever your machining problem may be in our engineering department is prepared to help you. Why not send us your specifications? Write for Baush Data Catalog No. 54.



BAUSH
MACHINE TOOL CO.
SPRINGFIELD 7, MASSACHUSETTS

Index to Advertisers

This Advertisers' Index is published as a convenience, and not as part of the advertising contract. Every care will be taken to index correctly. No allowance will be made for errors or failure to insert.

A

American Broach & Machine Co. 21
American Cystoscope Makers, Inc. 132
American Steel Foundries 133
Atlantic Abrasive Corp. 118
Avco Mfg. Co. (Lycoming Div.) 45

B

Baird Machine Co., The 76
Bakelite Co. 46-47
Baldwin-Lima-Hamilton Corp. 127
Baush Machine Tool Co. 135
Bendix Aviation Corporation
Eclipse Machine Div. 115
Products Div. 30
Bethlehem Steel Co. 130
Bodine Corp. 103
Brown Corp., The 104
Builders Steel Supply Co. 134
Bullard Company, The 19

C

Century Gas Equipment Co. 116
Chandler-Evans Div. Niles-Bement-Pond Co. 16-17
Cincinnati Milling Machine Co. 32
Classified Advertisements 123
Copperweld Steel Co. 91
Cotta Transmission Co. 1
Cross Company, The 12

D

Danly Machine Specialties, Inc. 9
Delco Products Div., G. M. 29
Delpark 15
du Pont de Nemours & Co., Inc. 107-108

E

Eaton Manufacturing Co. 77
Elmes Engineering Div. 133
Ex-Cell-O Corp. 5

F

Fairchild Engine & Airplane Corp. 119
Fellows Gear Shaper Co., The 42-43

G

G & O Mfg. Co. 134
Gear Grinding Machine Co. 112-113
Gishalt Machine Co. 93
Goodrich Chemical Co., B. F. 128

H

Handy & Harman 106
Hartford Special Machinery Co. 101
Hartford Steel Ball Co., The 110
Hassall, Inc., John 123

I

Industrial Filtration Co. 15
International Nickel Co., Inc. 2

J

Jones & Lamson Machine Co. 11
Jones Motrola Corp. 123

L

Lipe-Rollway Corp. 114
Long Manufacturing Div. 111
Lucas Machine Div. (New Britain Mach. Co.) 44
Lycoming Div., Avco Mfg. Corp. 45

M

Mahon Co., R. C. 24
Mallory & Co., Inc., P. R. 20
Markem Machine Co. 109
Mechanics Universal Joint Div. 18
Michigan Tool Co. 121-122
Milsco Mfg. Co. 132
Minneapolis-Honeywell Regulator Co. 7

N

National Acme Co. 97
New Britain Machine Co. (Lucas Machine Div.) 44
Niagara Machine & Tool Works 26-27

O

Ohio Crankshaft Co. 125
Ohio Seamless Tube Div. 78

P

Packard Electric Div. 14
Perfect Circle Corp. 95
Pittsburgh Plug & Products Co. 134
Potter & Johnston Co. 25

R

Raybestos-Manhattan Inc. (Equipment Sales Div.) 22-23
Republic Steel Corp. (Alloy Steel Div.) 117
Republic Steel Corp. (Steel & Tubes Div.) 138
Reynolds Metals Co. 105
Richards Co., J. A. 134

S

Schwitzer-Cummins Co. 73
Seneca Falls Machine Co. 129
Simmons Fastener Corp. 10
Snyder Tool & Engineering Co. 75
Solar Aircraft Co. 126
Standard Oil Co. (Ind.) ..... 2nd Cover
Standard Pressed Steel Co. 28
Staples Tool Co. 124
Sterling Aluminum Products, Inc. 99
Subscription Post-Card 88
Sun Oil Company 8
Synchro-Start Products, Inc. 134

T

Texas Company, The 4
Timken Roller Bearing Co. (Steel & Tube Div.) ..... Back Cover
Tuthill Spring Co. 134

U

United States Steel Corp. 74
United States Steel Supply Div. 74

V

Van Huffel Tube Corp. 131
Vinco Corp. 120

W

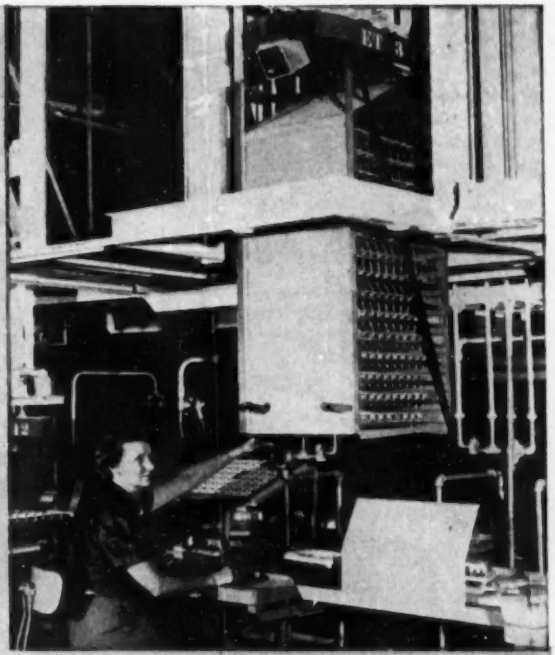
Waldes-Kohinoor, Inc. 13
Webb Co., Jervis B. 137
Western Felt Works 134
Wyman-Gordon 6

Z

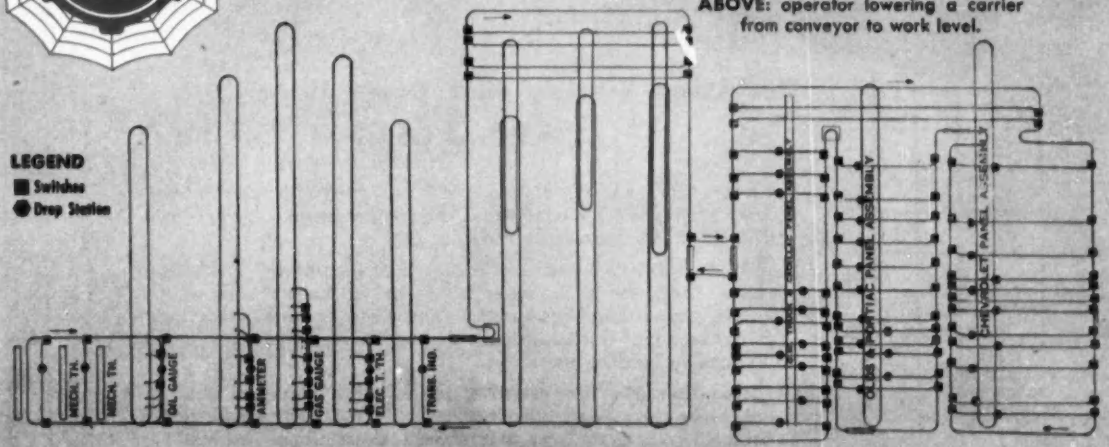
Zollner Machine Works ..... 3rd Cover

400
Electric Brains
Control Carriers on
POWER & FREE CONVEYORS

WEBB



ABOVE: operator lowering a carrier from conveyor to work level.



GENERAL ARRANGEMENT OF CONVEYORS AND ASSEMBLY LINES.

Four Hundred electric brains (selector switches) automatically guide loaded and empty parts carriers to predetermined assembly points over the 1320 feet of Webb Power & Free Conveyors at this Spark Plug plant. As carriers move along main Power & Free conveyors they are automatically switched into proper "siding" according to setting of selector switch. Conveniently located drop stations on each "siding" permit lowering of individual carriers to bench level.

Being fully automatic in operation, this Webb conveyor system maintains an unfailing flow of parts and sub-assemblies to workers. In addition, conveyors serve as storage banks that provide quick visual inventory and assure consumption of current production—rapid rotation of stock greatly reduces accumulation of dust on precision parts and results in inventory savings.

JERVIS B. WEBB CO.

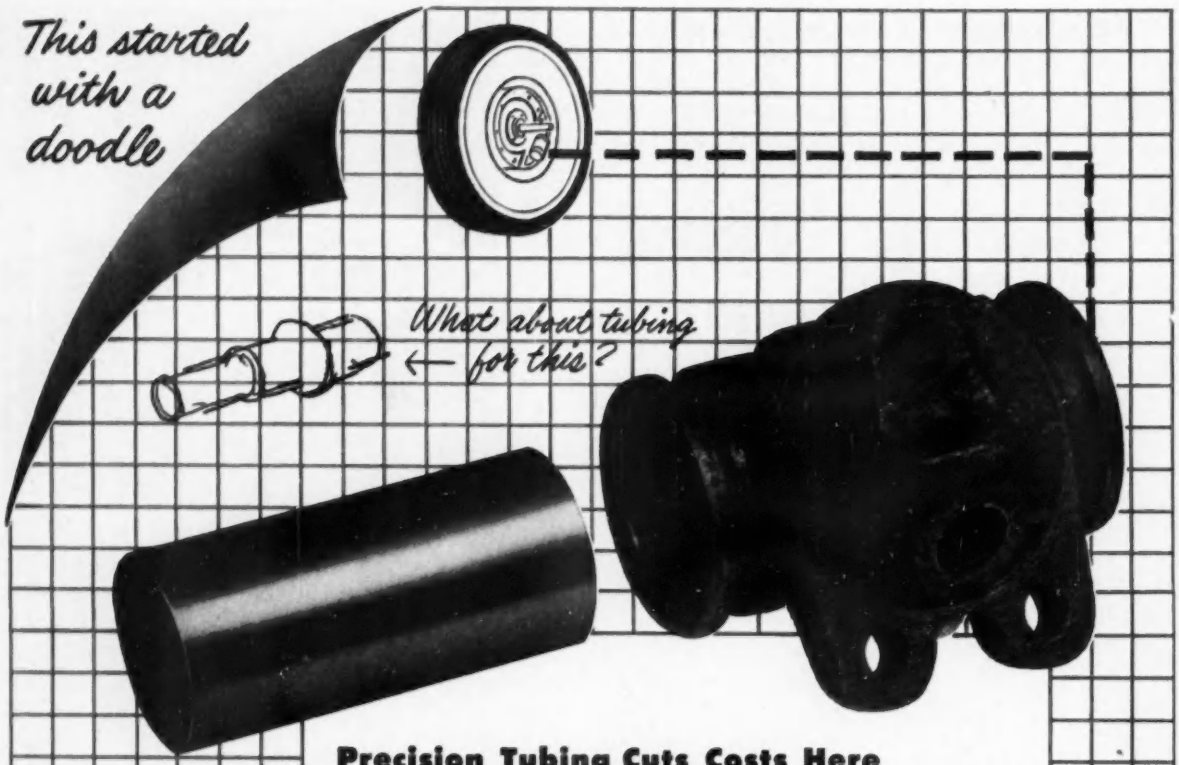
Conveyor Engineers and Manufacturers

8937 ALPINE AVENUE • DETROIT 4, MICHIGAN

Send for fully illustrated catalog that provides complete information on Webb conveyors

FACTORIES: DETROIT · LOS ANGELES · HAMILTON, ONTARIO

OFFICES AND REPRESENTATIVES THROUGHOUT THE WORLD



Precision Tubing Cuts Costs Here —What Can it do for You?

IT'S POSSIBLE to save money for your company and make a better product at the same time when you use precision tubing. Specifically, Republic ELECTRUNITE Tubing.

Autoline Supply Company of Chicago does it this way. The tubing they use for sleeving brake cylinders has to have a smooth surface. No pit marks. No scratches. The tolerance on a 1" cylinder is three and a half thousandths. If the tubing isn't smooth, it means an expensive honing operation.

By using Republic ELECTRUNITE Tubing, this operation is eliminated. So is tubing scrapped because of imperfect surface finish. Cylinders perform the way they should. Costs are kept down.

Does this give you an idea for using ELECTRUNITE Tubing in your products to cut material costs, speed production, or turn out better parts? Our engineers will be glad to help you take advantage of this precision tubing in either carbon or stainless steel analyses. Write to:

REPUBLIC STEEL CORPORATION
Steel and Tubes Division
252 E. 131st Street, Cleveland 8, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

REPUBLIC STEEL
REPUBLIC ELECTRUNITE TUBING

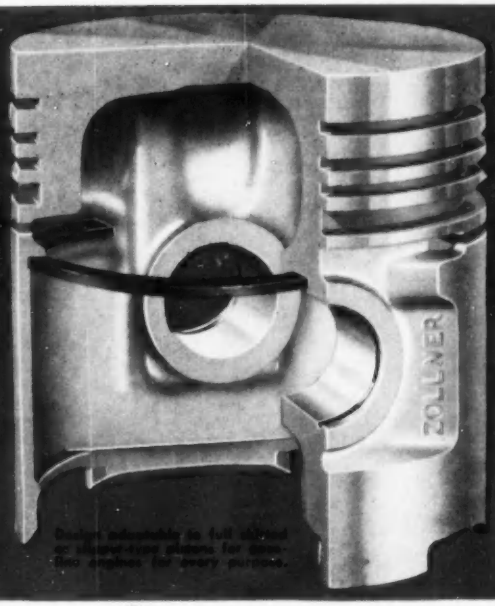
Sensational Piston Performance

UNIFORM CLEARANCE AT ALL TEMPERATURES

STEEL TENSION MEMBER

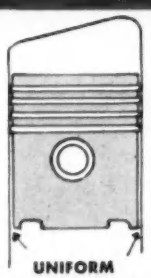
Anchored only at pin bosses and cast in positive contact with I. D. of piston skirt

Controls Clearance Automatically



ZOLLNER CLEAR-O-MATIC PISTONS

Now, pistons may be fitted to closer clearances than ever before possible. The sensational development of CLEAR-O-MATIC Pistons by Zollner engineers *reduces required clearance to less than .001 with constant uniformity of skirt bearing over the entire temperature range.* Performance results are spectacular. Engines run quietly with no cold slap. Friction is reduced without loss of durability or heat conductivity. There is no danger of scuffing or seizing. The Zollner designed steel tension member incorporates in the aluminum piston the same effective expansion as the ferrous cylinder itself. We urge your immediate test of these sensational advantages for your engine.



UNIFORM EFFECTIVE SKIRT CLEARANCE AT ALL TEMPERATURES

1. Clearance maintained uniformly at all coolant temperatures from 20° below zero to 200° F.
2. Effective expansion identical with ferrous cylinder.
3. Steel tension member, with same effective expansion as cylinder, maintains uniform skirt clearance through entire temperature range.
4. Normal diametric clearance usually less than .001 with uniform skirt bearing.
5. Durability and conductivity comparable to heavy duty design.

ZOLLNER PISTONS

THE ORIGINAL EQUIPMENT PISTONS

ZOLLNER

ZOLLNER MACHINE WORKS • Fort Wayne, Indiana

- ADVANCED ENGINEERING
- PRECISION PRODUCTION

in cooperation with engine builders

Only GRAPH-MO® gives you all three advantages in one tool steel

Wearability—*Outwears other tool steels 3 to 1*

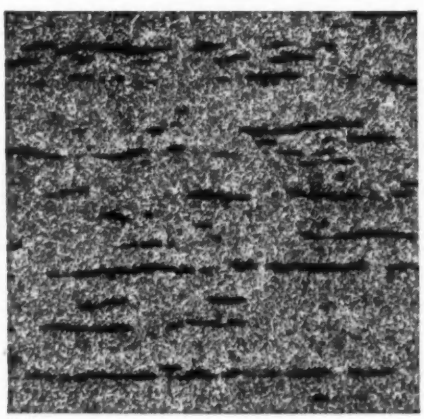
Stability—*Is the most stable gage steel ever made*

Machinability—*Cuts machining time 30%*

YOU can make gages and dies that stay accurate longer and produce them in less time by using Graph-Mo® graphitic tool steel. That's because only Graph-Mo gives you the combination of wearability, stability and machinability that you want in a tool steel.

Free graphite and diamond-hard carbides in the structure of Graph-Mo steel give gages and dies extraordinary life. Reports from users show that Graph-Mo outwears other tool steels 3 to 1.

In your plant, Graph-Mo steel will cut production time and rejects. Because of its graphitic structure, Graph-Mo steel machines 30% faster than other tool steels. This structure also gives excellent resistance to abrasion, and has minimum tendency to pick up, scuff or gall. Tests on Amsler Wear Machine show Graph-Mo has twice the resistance to galling when compared with ordinary tool steels.



100X

The greater stability of Graph-Mo steel enables you to make gages that stay accurate longer. After 12 years of service, for example, a typical Graph-Mo steel master plug gage showed less than 10 millionths of an inch change from its original dimensions.

You can always tell Graph-Mo steel by its "graphitic look"—the tiny, scattered, parallel marks barely visible on the surface of a piece of polished Graph-Mo. This built-in "trade-mark", the result of free graphite in its structure, can't be duplicated in ordinary steels. The photomicrograph at left shows the free graphite and diamond-hard carbides that give Graph-Mo unusual wear resistance.

Write today for more information on Graph-Mo steel. The Timken Roller Bearing Company, Steel and Tube Div., Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING